1957

ORDER NO. SD82062221C2

Service Manual

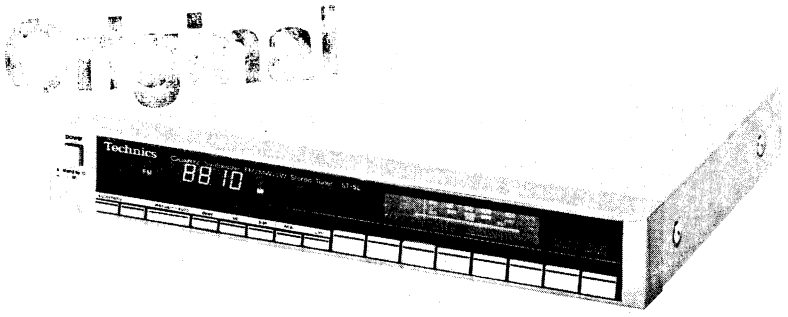
QUARTZ Synthesizer FM/MW/LW Stereo Tuner

ST-5L

[EX], [EK], [EF], [EB]

ST-5L(K)

[EX], [EK]



* The cabinet and front panel are available in black color and silver types.
* The black type model is provided with (K) in the Service Manual.

Areas

* [EX] is available in Switzerland and Scandinavia.
* [EK] is available in United Kingdom.
* [EF] is available in France.
* [EB] is available in Belgium.

Specifications

(Specifications are subject to change without notice for further improvement.)

(DIN 45 500)

■ FM TUNER SECTION

Frequency range	87.50~108.00 MHz
Sensitivity	1.0 μV (IHF, usable)
(For United Kingdom)	
S/N 30 dB	2.0 μV (300Ω), 1.0 μV (75Ω)
S/N 26 dB	1.8 μV (300Ω), 0.9 μV (75Ω)
S/N 20 dB	1.6 μV (300Ω), 0.8 μV (75Ω)
(For others)	
S/N 30 dB	1.0 μV (75Ω)
S/N 26 dB	0.9 μV (75Ω)
S/N 20 dB	0.8 μV (75Ω)
IHF 46 dB stereo quieting sensitivity	22.0 μV/75Ω
Total harmonic distortion	
MONO	0.08%
STEREO	0.15%
S/N	
MONO	70 dB (78 dB, IHF)
STEREO	65 dB (73 dB, IHF)
Frequency response	20 Hz~15 kHz, +0.5 dB~ −1.5 dB
Alternate channel selectivity	
normal ±400 kHz	65 dB
Capture ratio	1.0 dB
Image rejection at 98 MHz	55 dB
IF rejection at 98 MHz	80 dB
Spurious response rejection at 98 MHz	80 dB
AM suppression	55 dB
Stereo separation	
1 kHz	40 dB
10 kHz	30 dB
Carrier leak	
19 kHz	−30 dB (−35 dB, IHF)
38 kHz	−45 dB (−50 dB, IHF)
Channel balance (250 Hz~6,300 Hz)	±1.0 dB
Limiting point	1.9 μV
Bandwidth	
IF amplifier	180 kHz
FM demodulator	1000 kHz
Antenna terminals	
(For United Kingdom)	300Ω (balanced) 75Ω (unbalanced)
(For others)	75Ω (unbalanced)

■ AM TUNER SECTION

Frequency range	
MW	522~1611 kHz (9-kHz steps) 530~1620 kHz (10-kHz steps)
LW	153~353 kHz (9-kHz steps)
Sensitivity (S/N 20 dB)	
MW	20 μV, 300 μV/m
LW	50 μV
Selectivity (±9 kHz)	
MW	55 dB
LW	55 dB
Image rejection at 999 kHz	
MW	40 dB
LW (at 254 kHz)	40 dB
IF rejection at 999 kHz	
MW	65 dB
LW (at 254 kHz)	35 dB

■ GENERAL

Output voltage	0.6V
Power consumption	9W
Power supply	
(For United Kingdom)	AC 50 Hz/60 Hz, 240V
(For others)	AC 50 Hz/60 Hz, 220V
Dimensions (W×H×D)	315 × 50 × 244 mm (12-13/32" × 1-31/32" × 9-9/32")
Weight	2.0 kg (4.4 lb.)

Technics

Matsushita Electric Trading Co., Ltd.
P.O. Box 288, Central Osaka Japan

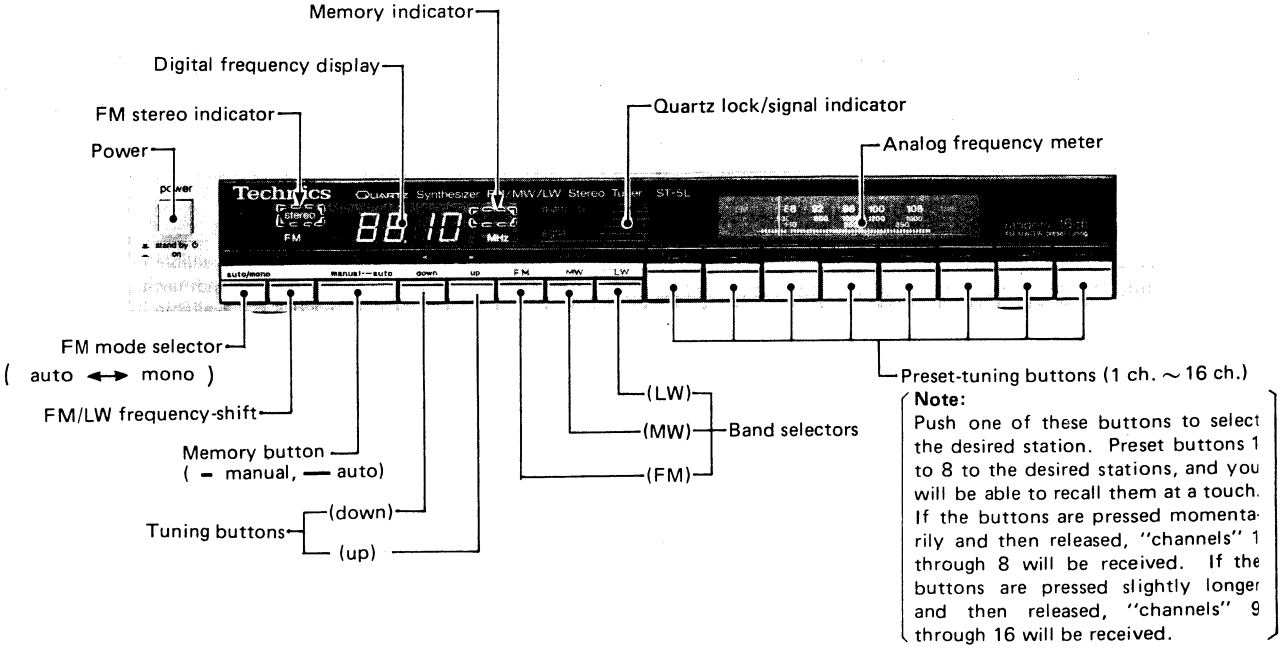
1957

ST-5L

■ CONTENTS

	Page
LOCATION OF CONTROLS	2, 3
DISASSEMBLY INSTRUCTIONS	3 ~ 5
CONNECTION TO AMPLIFIER	5
AM LOOP ANTENNA	5
MEASUREMENTS AND ADJUSTMENTS	6, 7
RESISTORS & CAPACITORS	8
CIRCUIT BOARDS AND WIRING CONNECTION DIAGRAM	9, 10
TERMINAL OPERATION OF PLL CONTROLLER (IC901)	11
BLOCK DIAGRAM	12 ~ 14
SCHEMATIC DIAGRAM	15 ~ 17
EXPLODED VIEWS	18, 19
REPLACEMENT PARTS LIST	20

■ LOCATION OF CONTROLS


Memory indicator
Digital frequency display
FM stereo indicator
Power
Quartz lock/signal indicator
Analog frequency meter
FM mode selector
(auto ◄► mono)
FM/LW frequency-shift
Memory button
(– manual, — auto)
Tuning buttons
(down)
(up)
(LW)
(MW)
(FM)
Band selectors
Preset-tuning buttons (1 ch. ~ 16 ch.)
Note:
Push one of these buttons to select the desired station. Preset buttons 1 to 8 to the desired stations, and you will be able to recall them at a touch. If the buttons are pressed momentarily and then released, "channels" 1 through 8 will be received. If the buttons are pressed slightly longer and then released, "channels" 9 through 16 will be received.

• Operation of FM/LW frequency-shift selector (freq. shift)

This switch is used to shift the reception frequency of the unit in accordance with the transmission frequency of the broadcasting station.

For FM broadcasts:

When the button is pressed, the reception frequency increases by 0.025 MHz (25 kHz). (Note, however, that the indication will only be 0.02 MHz.)

So, for example, to receive 98.025 MHz, tune to 98.00 MHz, and then press this button. Likewise, to receive 98.075 MHz, tune to 98.05 MHz, and then press this button.

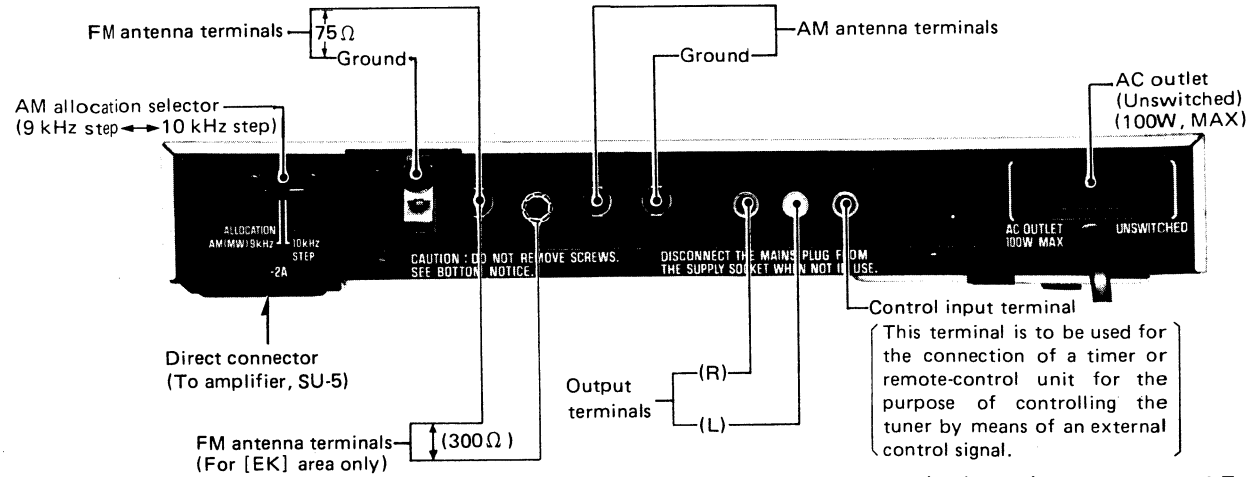
In order to return to the original frequency indication, press this button again.

For LW broadcasts:

When this button is pressed, the reception frequency decreases by 0.002 MHz (2 kHz.)

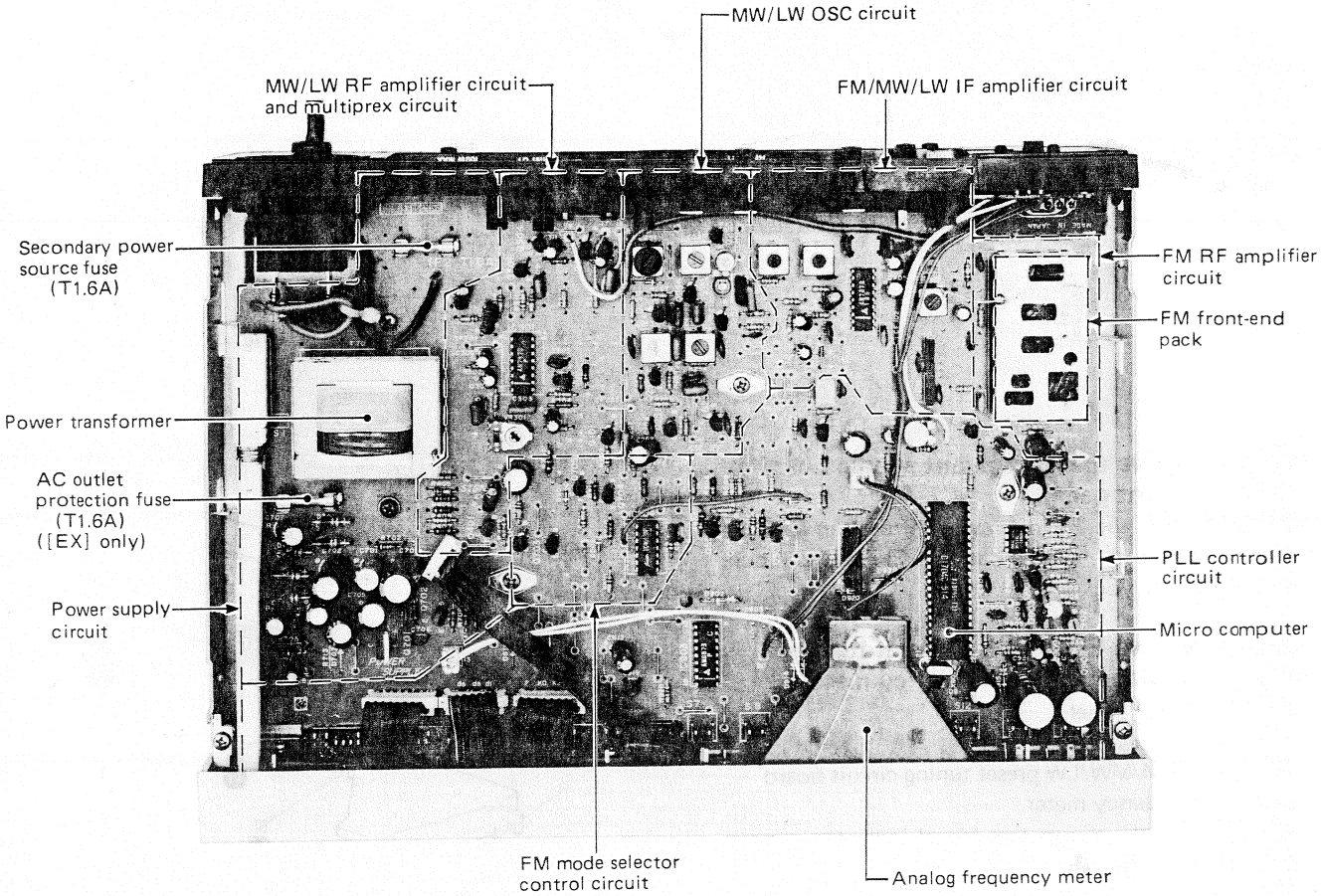
So, for example, to receive 153 kHz, tune to 155 kHz, and then press this button.

In order to return to the original frequency indication, press this button again.



- **The power supply for this unit varies depending upon the areas. Also, the parts used for power supply are different.**

***220V (50/60 Hz) for Continental Europe**
***240V (50/60 Hz) for United Kingdom.**

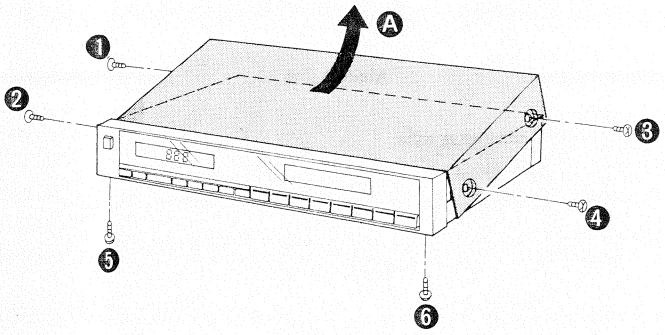


■ DISASSEMBLY INSTRUCTIONS

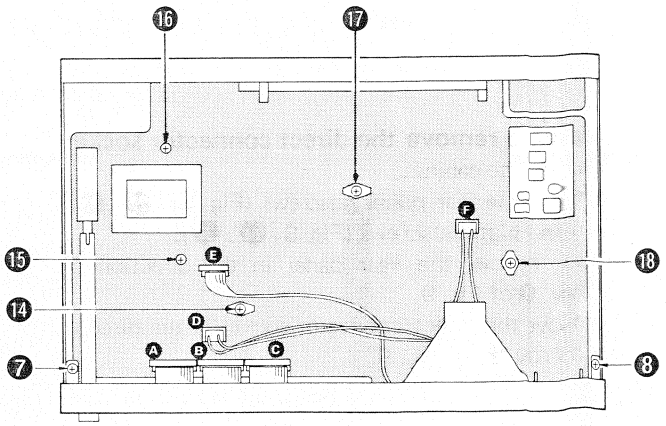
Note: When repairing the FM front-end pack, replace it with the adjusted part for repair.

(1) How to remove the front panel

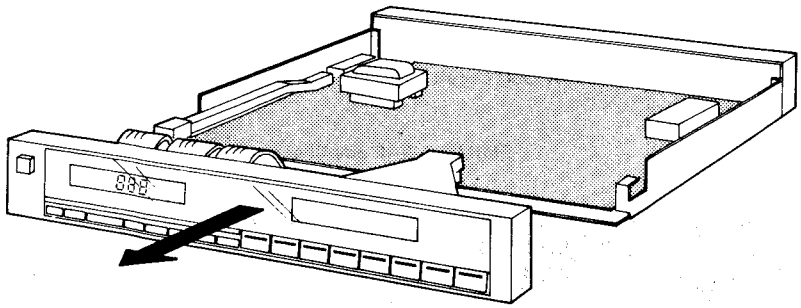
1. Remove the 4 setscrews (❶ ~ ❹ in Fig. 1) of the cabinet.
2. Move the cabinet in the direction of the arrow Ⓐ in the Fig. 1.
3. Disconnect the 6 leads (Fig. 2 : Ⓐ ~ Ⓕ) connected from the front panel to the set.
4. Remove the 4 setscrews (Fig. 1 : ❺,❻ Fig. 2 :❼,❽) of the front panel.
   Then remove the front panel as shown in Fig. 3.



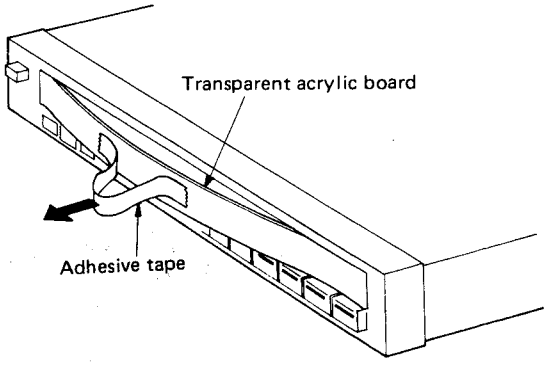
[Fig. 1]



[Fig. 2]



[Fig. 3]



[Fig. 4]

(2) How to remove the transparent acrylic board at FL of the front panel.

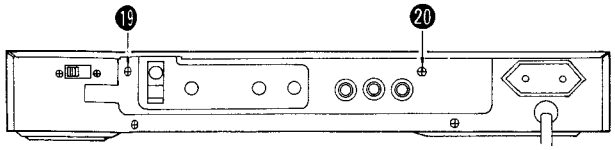
When removing the FL display tube to clean it, stick adhesive tape to the acrylic board as in Fig. 4 and pull the tape toward you.

(3) How to remove FM/MW/LW preset-tuning circuit board and analog frequency meter.

1. Remove the front panel.
2. Remove the 4 setscrews (Fig. 5 : ❾, ❿, ⓬, ⓭) used to secure the FM/MW/LW preset tuning circuit board and analog frequency meter.
3. When removing the quartz lock/signal indicator, remove the setscrew (Fig. 5 : ⓫).

(4) How to remove the main P.C.B.

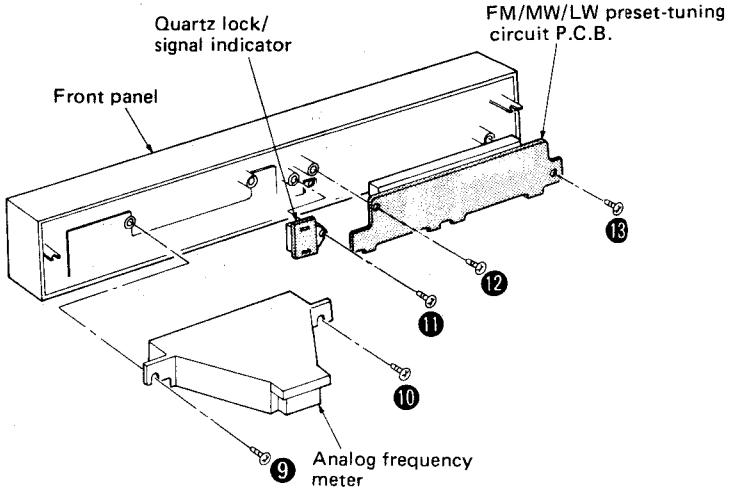
1. Remove the front panel.
2. Remove the 5 setscrews (Fig. 2 : ⓮ ~ ⓲).
3. Remove the 2 setscrews (Fig. 6 : ⓳, ⓴) of the terminal plate, and remove the main P.C.B. as in Fig. 7.
4. When mounting the main P.C.B., completely fit the main P.C.B. onto the spacer and secure it with the setscrews.



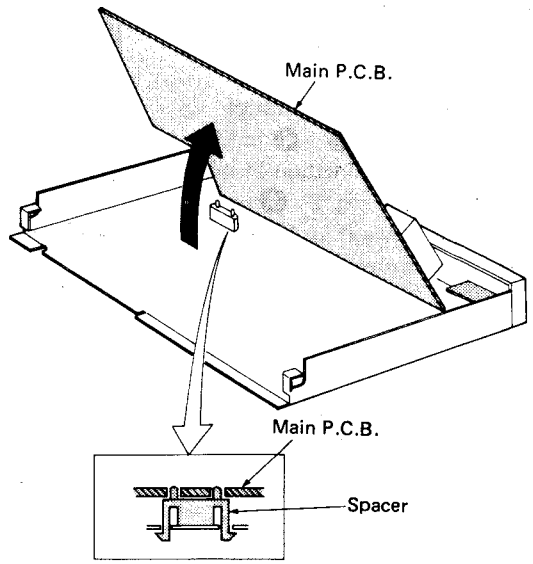
[Fig. 6]

(1) How to remove the direct connector socket

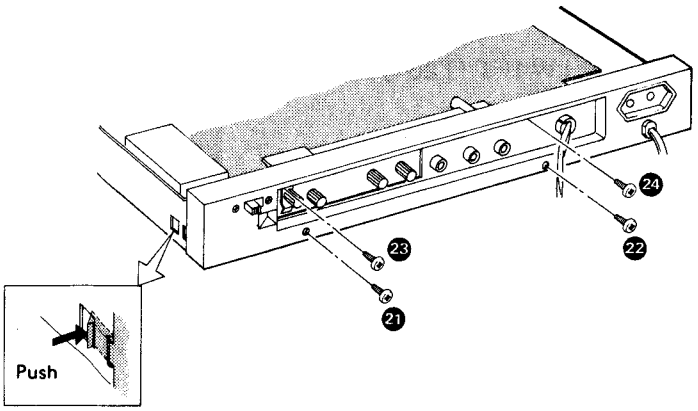
1. Remove the cabinet.
2. Remove the rear panel setscrews (Fig. 8 : ㉑, ㉒) and terminal plate setscrews (Fig. 8 : ㉓, ㉔).
   Then remove the rear panel in the direction of the arrow Ⓑ of Fig. 9.
3. Remove the direct connector socket in the direction of the arrow Ⓒ of Fig. 9.



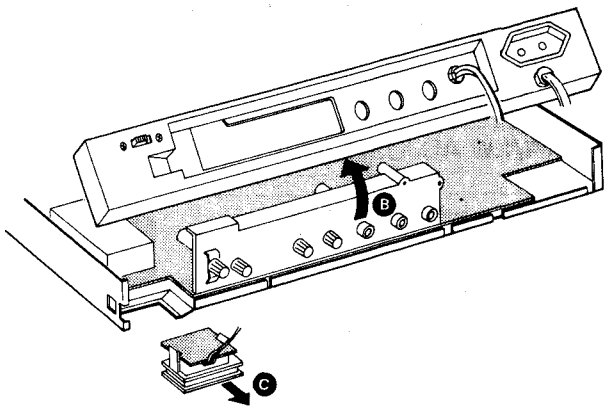
[Fig. 5]



[Fig. 7]



[Fig. 8]

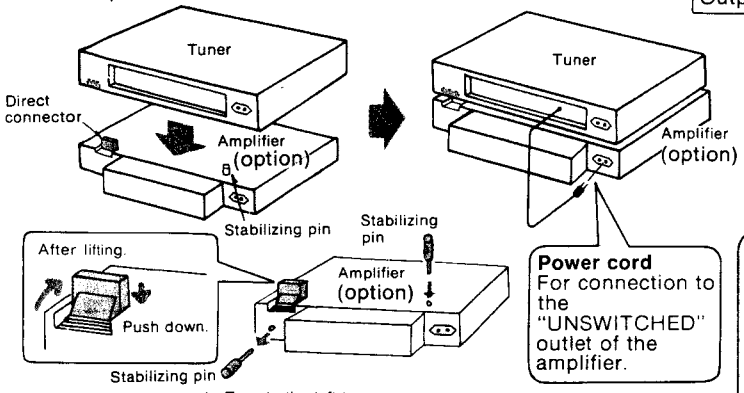


[Fig. 9]

■ CONNECTION TO AMPLIFIER

When Stacking the Units Vertically, connect using direct connectors.

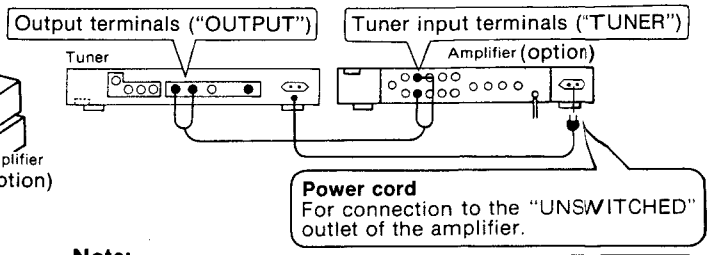
① Lift the direct connector on the amplifier and move the stabilizing pin from the back panel to the upper surface.
② Connect the power cord of the tuner to the AC outlet of the amplifier.



1. Turn to the left to remove.
2. After inserting the stabilizing pin, turn it 90° to the right and confirm that it cannot come out.

When Placing the Units Side by Side, connect them using the pin cords.

① Connect the amplifier to the tuner using the pin cord
② Connect the power cord of the tuner to the AC outlet of the amplifier.



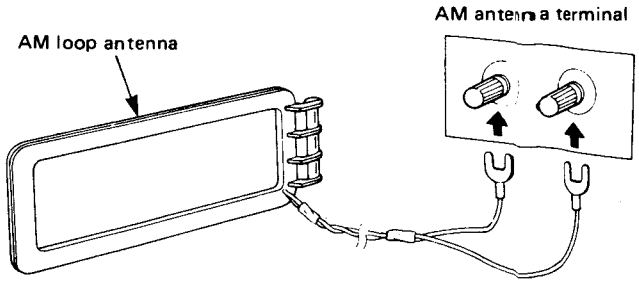
Note:

1. **Be sure to connect the power cord of the tuner to the "UNSWITCHED" power outlet of the amplifier (SU-5) to be used.**
2. **If the power supply is interrupted for one week or longer, the memory settings will be erased.**

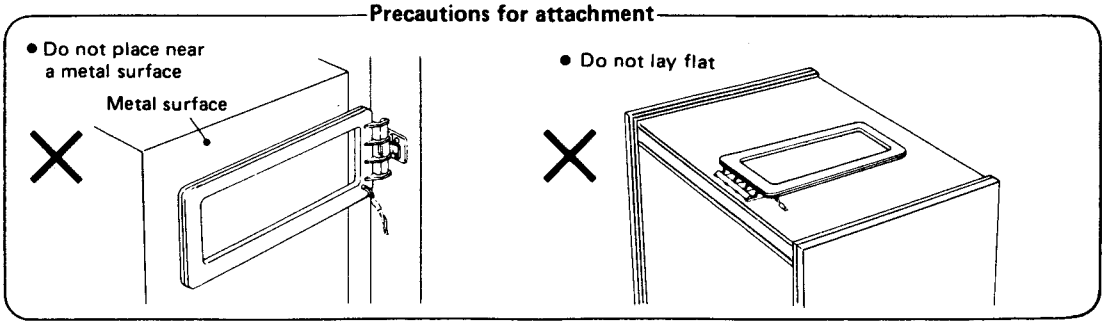
The memory in this unit is maintained by a gold capacitor. If the power supply is interrupted for a week or longer, set the power switch of the tuner to the "on" position for thirty minutes or more in order to recharge the gold capacitor.

■ AM LOOP ANTENNA

Since the unit does not employ the conventional AM bar antenna, be sure to connect the AM loop antenna to the AM antenna terminal on the back of the set when receiving AM antenna terminal. When the AM loop antenna is connected to the rear panel, place it as far away from the set as possible to improve the sensitivity.



Precautions for attachment



■ MEASUREMENTS AND ADJUSTMENTS

Note: MW OSC coil (L203), LW antenna coil (L251) and MW/LW IFT (T201) have been already adjusted, and require no adjustment.

MW/LW ADJUSTMENT

*** Setting and Equipment used**

1. AC electronic voltmeter (VTVM)
2. AM signal generator (AM-SG)
3. Band selector switch . . . . . { MW (MW Adjustment) / LW (LW Adjustment)
4. Set AM (MW) allocation selector to "9 kHz step" position.
5. Maintain line voltage at rated voltage.
6. Output of signal generator should be no higher than necessary to obtain an output reading.
7. Use a non-metal screwdriver for the adjustment.

Step No.	AM SIGNAL GENERATOR CONNECTION	AM SIGNAL GENERATOR FREQUENCY	DISPLAY FREQUENCY	PREPARATIONS	PARTS ADJUSTED	ADJUSTING PROCEDURE
	MW-RF ADJUSTMENT					
1	Connect AM-SG to AM antenna terminal through 200pF capacitor. Common to chassis. (Weak input)	612 kHz (30% Mod. with 400 Hz)	612 kHz	Connect AC VTVM or scope to "Output" terminals of the set.	L202 (ANT Coil)	1. Adjust for maximum output. 2. Adjust core of L202 by screwdriver.
2		1503 kHz (30% Mod. with 400 Hz)	1503 kHz	Connect AC VTVM or scope to "Output" terminals of the set.	CT201 (ANT Trimmer)	1. Adjust for maximum output. 2. Repeat steps (1) and (2) until the frequency correctly matches the dial display.
	LW-RF ADJUSTMENT					
3	Connect AM-SG to AM antenna terminal through 200pF capacitor. Common to chassis. (Weak input)	155 kHz (30% Mod. with 400 Hz)	155 kHz	Connect AC VTVM or scope to "Output" terminals of the set.	L253 (OSC Coil)	1. Adjust for maximum output. 2. Adjust core of L253 by screwdriver.
4		353 kHz (30% Mod. with 400 Hz)	353 kHz	Connect AC VTVM or scope to "Output" terminals of the set.	CT251 (ANT Trimmer)	1. Adjust for maximum output. 2. Repeat steps (3) and (4) until the frequency correctly matches the dial display.

FM ADJUSTMENT

*** Setting and Equipment used**

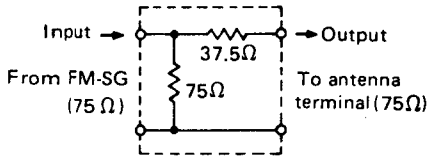
1. FM signal generator (FM-SG)
2. Distortion analyser.
3. DC electronic voltmeters (VTVM).
4. Frequency counter (19 kHz and 108 MHz measurable).
5. FM 75Ω dummy antenna (Fig. 10).
6. Set band selector to "FM" position.
7. Set FM mode selector to "mono" position.
8. Other setting are the same as in AM adjustment.

*** Preparation of FM signal generator (FM-SG)**

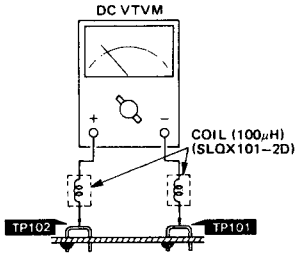
1. Apply SG output to antenna terminal of the set through 300Ω FM dummy antenna.
2. The standard input of the set is 60 dB (1mV), 400 Hz, 100% modulation (Because of using dummy antenna, SG output must be 12 dB plus (IHF). That is, when input 60 dB, SG output is to be 72 dB).

Step No.	FM SIGNAL GENERATOR CONNECTION	FM SIGNAL GENERATOR FREQUENCY	DISPLAY FREQUENCY	PREPARATIONS	PARTS ADJUSTED	ADJUSTING PROCEDURE
	FM MONO DISTORTION ADJUSTMENT					
5	Connect FM-SG to FM antenna terminal through 75Ω FM dummy antenna. (Apply 60dB to antenna terminal)	No-Signal	100.1 MHz	Connect DC VTVM to between TP101 and TP102 through choke coil. (Refer to Fig. 11)	T101 (Discri. IFT)	1. Adjust T101 core so that voltage measured in signal mode is 0mV in 300mV range. 2. Adjust T102 core so that distortion of right and left channels are minimized.
6		100.1 MHz (100% Mod. with 400 Hz)	100.1 MHz	Connect distortion analyser to "Output" terminal of the set.	T102 (Discri. IFT)	
	FM MPX PILOT (VCO) ADJUSTMENT					
7	Connect FM-SG to FM antenna terminal through 75Ω FM dummy antenna. (Apply 60dB to antenna terminal)	100.1 MHz (Non-modulated)	100.1 MHz	Connect frequency counter to TP301 terminal through resistor. (100kΩ)	VR301 (VCO)	1. Set the FM mode selector to "auto" position. 2. Adjust VR301 to 19 kHz ± 30 Hz.

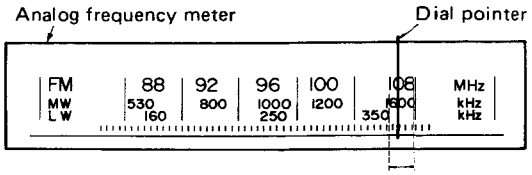
Step No.	FM SIGNAL GENERATOR CONNECTION	FM SIGNAL GENERATOR FREQUENCY	DISPLAY FREQUENCY	PREPARATIONS	PARTS ADJUSTED	ADJUSTING PROCEDURE
	FM ANALOG FREQUENCY METER					
8	——	No-Signal	108.0 MHz	——	VR901 (Frequency meter)	1. Adjust VR901 so that the frequency meter indicates 108.0 MHz. (Refer to Fig. 12) 2. Next operate the tuning button so that 88.1 MHz and 100.1 MHz are indicated in the digital frequency display. Then make sure that the indicator is in contact with each letter. 3. If the requirement in step 2 is not satisfied, go back to step 1 and adjust the indicator within the dotted line of Fig. 12.



[Fig. 10]

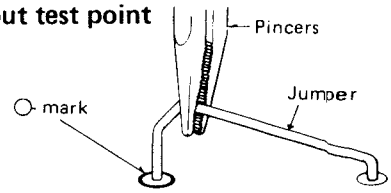


[Fig. 11]



[Fig. 12]

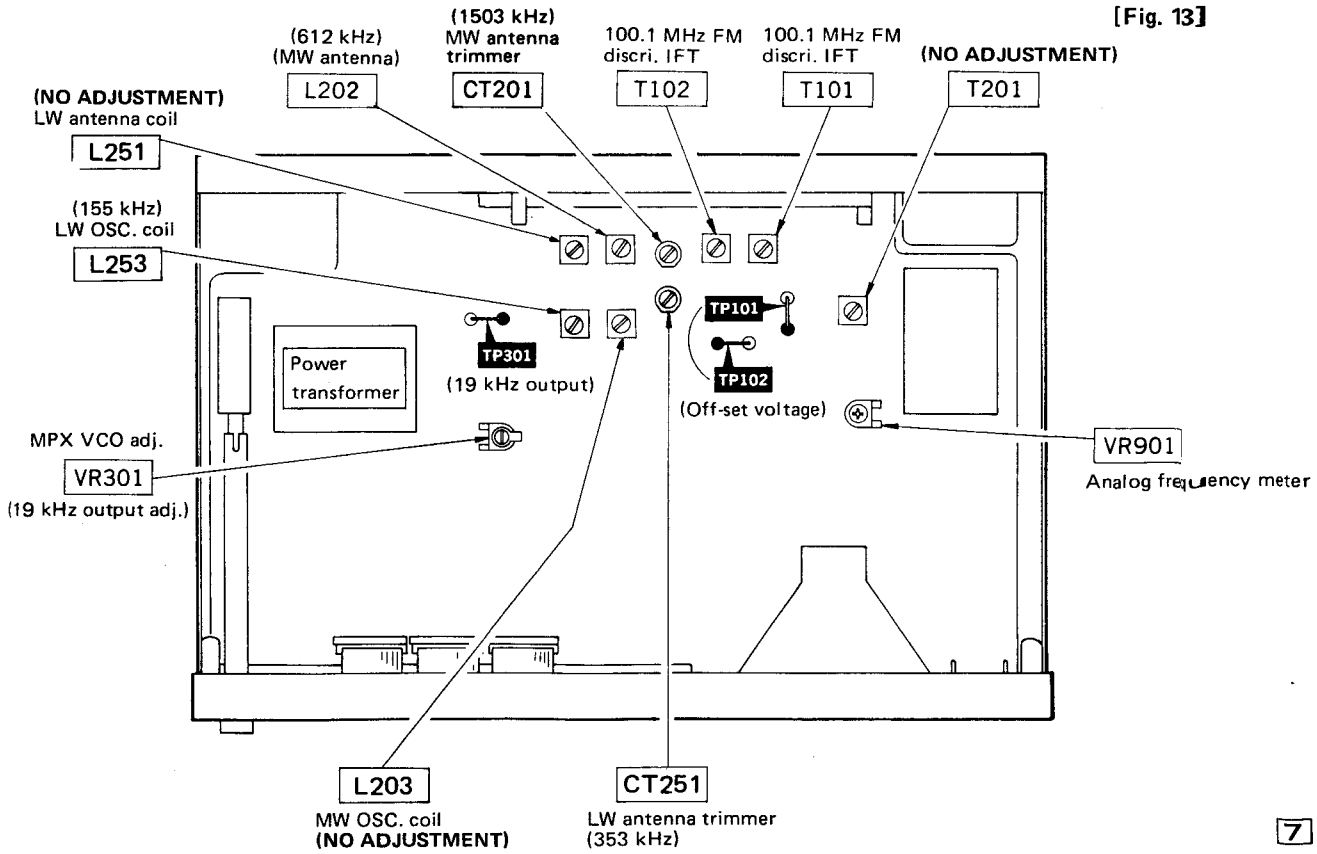
- About test point



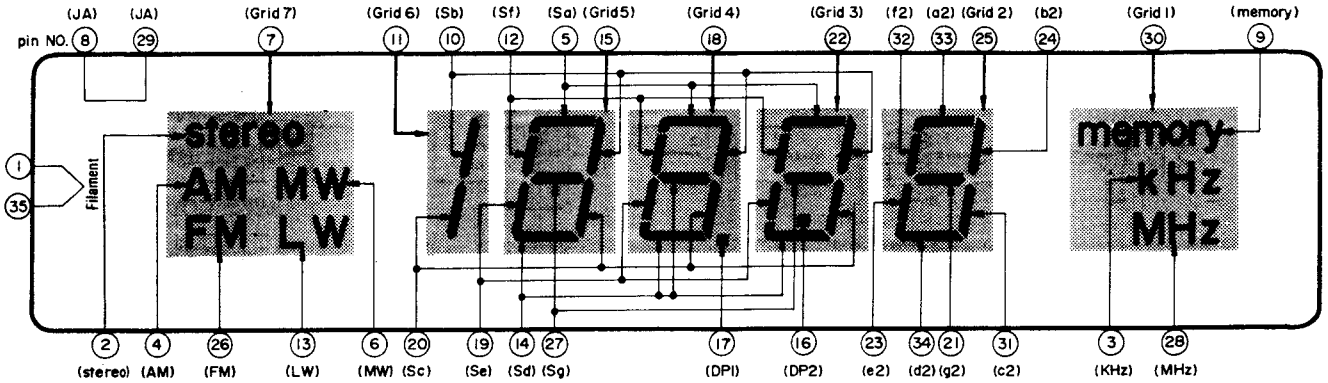
It can be removed by pulling the ○ - marked side by use of pincers. Insert it into the original hole when not needed.

[Fig. 13]

- Adjustment points



- **Digital frequency display tube (FL)**



■ RESISTORS & CAPACITORS

Notes:
1. Part numbers are indicated on most mechanical parts. Please use this part number for parts orders.
2. Important safety notice: Components identified by ⚠ mark have special characteristics important for safety. When replacing any of these components use only manufacturer's specified parts.
3. The " **S** " mark is service standard parts and may differ from production parts.
4. Unless otherwise specified. All resistors are in OHMS (Ω) K = 1000Ω , M = 1000kΩ All capacitors are in MICROFARADS (μF) P = μμF

Numbering System of Resistor

Example

ERD	25	F	J	101
Type	Wattage	Shape	Tolerance	Value

Resistor Type	Wattage	Tolerance
ERD : Carbon ERQ : Fuse Type Metal	12 : 1/2W 25 : 1/4W	J : ± 5%

Numbering System of Capacitor

Example

ECKD	1H	102	Z	F
Type	Voltage	Value	Tolerance	Peculiarity

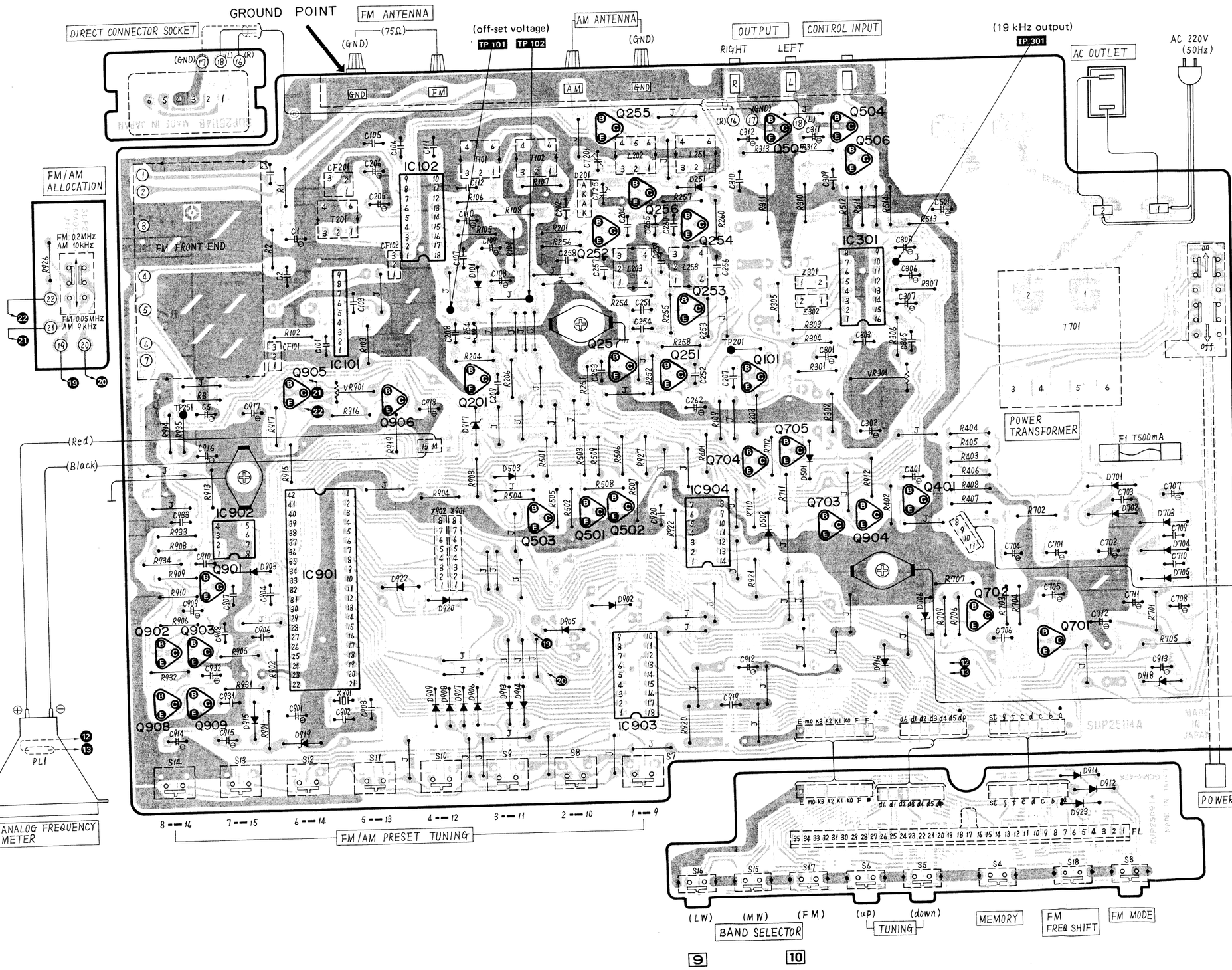
ECEA	50	M	R47	R
Type	Voltage	Peculiarity use	Value	Special use

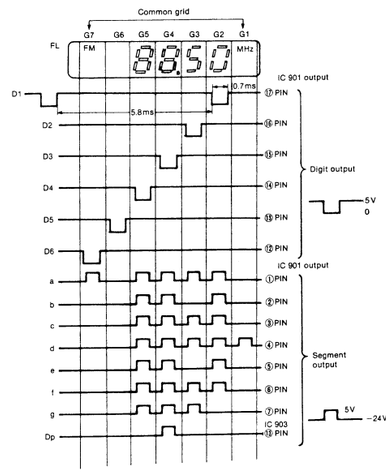
Capacitor Type	Voltage		Tolerance
	ECEA Type	Other	
ECEA : Electrolytic	0J : 6.3V	1H : 50V DC	C : ± 0.25pF
ECCD : Ceramic	1A : 10V	2H : 500V DC	J : ± 5%
ECKD : Ceramic	1C : 16V	2R3 : 2.3V DC	K : ± 10%
ECQM : Polyester	1E : 25V		Z : +80%, −20%
ECQP : Polypropylene	1H : 50V		
EECW : Liquid electrolyte double layer capacitor	50 : 50V 25 : 25V		

Ref. No.		Part No.	Value
RESISTORS			
R1	S	ERD25TJ104	100K
R2	S	ERD25TJ273	27K
R3	S	ERD25FJ151	150
R102	S	ERD25FJ331	330
R103	S	ERD25FJ102	1K
R104	S	ERD25FJ471	470
R105	S	ERD25FJ102	1K
R106	S	ERD25FJ472	4.7K
R107	S	ERD25FJ272	2.7K
R108	S	ERD25FJ471	470
R109	S	ERD25TJ104	100K
R201	S	ERD25TJ104	100K
R203	S	ERD25FJ102	1K
R204	S	ERD25TJ684	680K
R206	S	ERD25FJ102	1K
R251	S	ERD25TJ473	47K
R252	S	ERD25TJ563	56K
R253	S	ERD25FJ182	1.8K
R254	S	ERD25FJ332	3.3K
R255, 256	S	ERD25FJ562	5.6K
R257	S	ERD25TJ153	15K
R258	S	ERD25FJ562	5.6K
R260	S	ERD25TJ333	33K
R301	S	ERD25TJ393	39K
R302	⚠S	ERD25FJ151	150
R303, 304	S	ERD25TJ223	22K
R305	S	ERD25TJ274	270K
R306	S	ERD25TJ153	15K
R307	S	ERD25FJ102	1K
R310, 311	S	ERD25FJ332	3.3K
R312, 313	S	ERD25TJ333	33K
R401	S	ERD25FJ182	1.8K
R402	S	ERD25FJ562	5.6K
R403	S	ERD25FJ821	820
R404	S	ERD25FJ331	330
R405	S	ERD25FJ151	150
R406	S	ERD25FJ121	120
R407	S	ERD25FJ100	10
R408	S	ERD25FJ122	1.2K
R501	S	ERD25TJ153	15K
R502	S	ERD25TJ104	100K
R503	S	ERD25TJ563	56K
R504	S	ERD25TJ473	47K
R505	S	ERD25TJ393	39K
R506	S	ERD25TJ104	100K
R507	S	ERD25TJ473	47K
R508, 509	S	ERD25TJ563	56K
R511	S	ERD25FJ102	1K
R512	S	ERD25TJ104	100K
R513	S	ERD25FJ103	10K
R514	S	ERD25TJ104	100K
R701	S	ERD25FJ122	1.2K
R702	⚠S	ERD25FJ6R8	6.8
R703	S	ERD25FJ471	470
R704	⚠S	ERD25FJ2R2	2.2
R705	⚠S	ERQ12HJ100	10
R706	S	ERD25FJ472	4.7K
R707	S	ERD25FJ392	3.9K
R709	S	ERD25FJ391	390
R710	S	ERD25TJ473	47K
R711	S	ERD25FJ103	10K
R712	S	ERD25TJ473	47K
R901	S	ERD25FJ681	680
R902	S	ERD25FJ103	10K
R903	S	ERD25FJ472	4.7K
R904	S	ERD25FJ562	5.6K
R905	S	ERD25FJ102	1K
R906	S	ERD25FJ561	560
R908	S	ERD25FJ682	6.8K
R909	S	ERD25TJ123	12K
R910	S	ERD25FJ682	6.8K
R912	S	ERD25TJ104	100K
R913	S	ERD25TJ684	680K
R914	⚠S	ERD25FJ101	100
R915	S	ERD25FJ103	10K
R916	S	ERD25TJ184	180K
R917	S	ERD25TJ224	220K
R919	S	ERD25FJ103	10K
R920	S	ERD25FJ102	1K
R921, 922	S	ERD25TJ104	100K
R926	S	ERD25TJ104	100K
R927	S	ERD25TJ333	33K
R931	S	ERD25FJ102	1K
R932	S	ERD25FJ472	4.7K
R933	S	ERD25FJ471	470
R934	S	ERD25TJ153	15K
R935	S	ERD25FJ222	2.2K
CAPACITORS			
C1	S	ECEA50Z3R3	3.3
C2	S	ECKD1H103ZF	0.01
C4	S	ECKD1H103ZF	0.01
C5	S	ECEA1ES101	100
C101	S	ECKD1H103ZF	0.01
C103	S	ECKD1H103ZF	0.01
C105, 106	S	ECKD1H223ZF	0.022
C107	S	ECKD1H223ZF	0.022
C108	S	ECEA50Z1	1
C109, 110	S	ECEA1HS100	10
C111	S	ECKD1H223ZF	0.022
C112	S	ECCD1H101K	100P
C202		ECQM1H473KV	0.047
C204		ECQP1471JZ	470P
C205	S	ECEA1AS101	100
C206	S	ECEA25Z4R7	4.7
C207	S	ECQM1H183JZ	0.018
C208		ECCD1H390K	39P
C209	S	ECKD1H103ZF	0.01
C251	S	ECKD1H223ZF	0.022
C252	S	ECKD1H103ZF	0.01
C253	S	ECKD1H223ZF	0.022
C254	S	ECQM1H223JZ	0.022
C255		ECQP1271JZ	270P
C256, 257	S	ECKD1H223ZF	0.022
C258	S	ECCD1H050CC	5P
C259	S	ECQM1H223JZ	0.022
C260	S	ECCD1H101KC	100P
C262	S	ECEA1ES101	100
C301	S	ECEA1HS100	10
C302	S	ECEA1CS221	220
C303		ECQM1H473KV	0.047
C305		ECQP1471JZ	470P
C306	S	ECEA50Z1	1
C307	S	ECEA50Z3R3	3.3
C308	S	ECEA50ZR47	0.47
C309, 310	S	ECQM1H153JZ	0.015
C311, 312	S	ECEA50ZR47	0.47
C401	S	ECEA50Z3R3	3.3
C501	S	ECEA50Z1	1
C701	S	ECEA1CS331	330
C702	S	ECEA1CS471	470
C703	S	ECKD2H681KB	680P
C704	S	ECEA1VS471	470
C705	S	ECEA1CS471	470
C706	S	ECKD1H103ZF	0.01
C707	S	ECEA1VS470	47
C708	S	ECEA1HS470	47
C709, 710	S	ECKD2H681KB	680P
C711	S	ECEA1HS470	47
C712	S	ECEA1VS101	100
C901	S	ECEA0JS102	1000
C902	S	ECCD1H070CC	7P
C903	S	ECCD1H180KC	18P
C904	S	ECKD1H103ZF	0.01
C906, 907	S	ECKD1H103ZF	0.01
C908	S	ECKD1H103ZF	0.01
C909	S	ECEA50M4R7R	4.7
C910	S	ECKD1H103ZF	0.01
C912	S	ECEA1AS101	100
C913	S	ECEA50Z3R3	3.3
C914, 915		EECW2R3A3R3	3.3F
C916	S	ECEA1ES101	100
C917	S	ECEA50Z4R7	4.7
C918	S	ECEA1AS221	220
C919, 920	S	ECKD1H103ZF	0.01
C931	S	ECKD1H223ZF	0.022
C932	S	ECEA50ZR33	0.33
C933	S	ECKD1H223ZF	0.022

■ CIRCUIT BOARDS AND WIRING CONNECTION DIAGRAM

Ground (Earth) lines



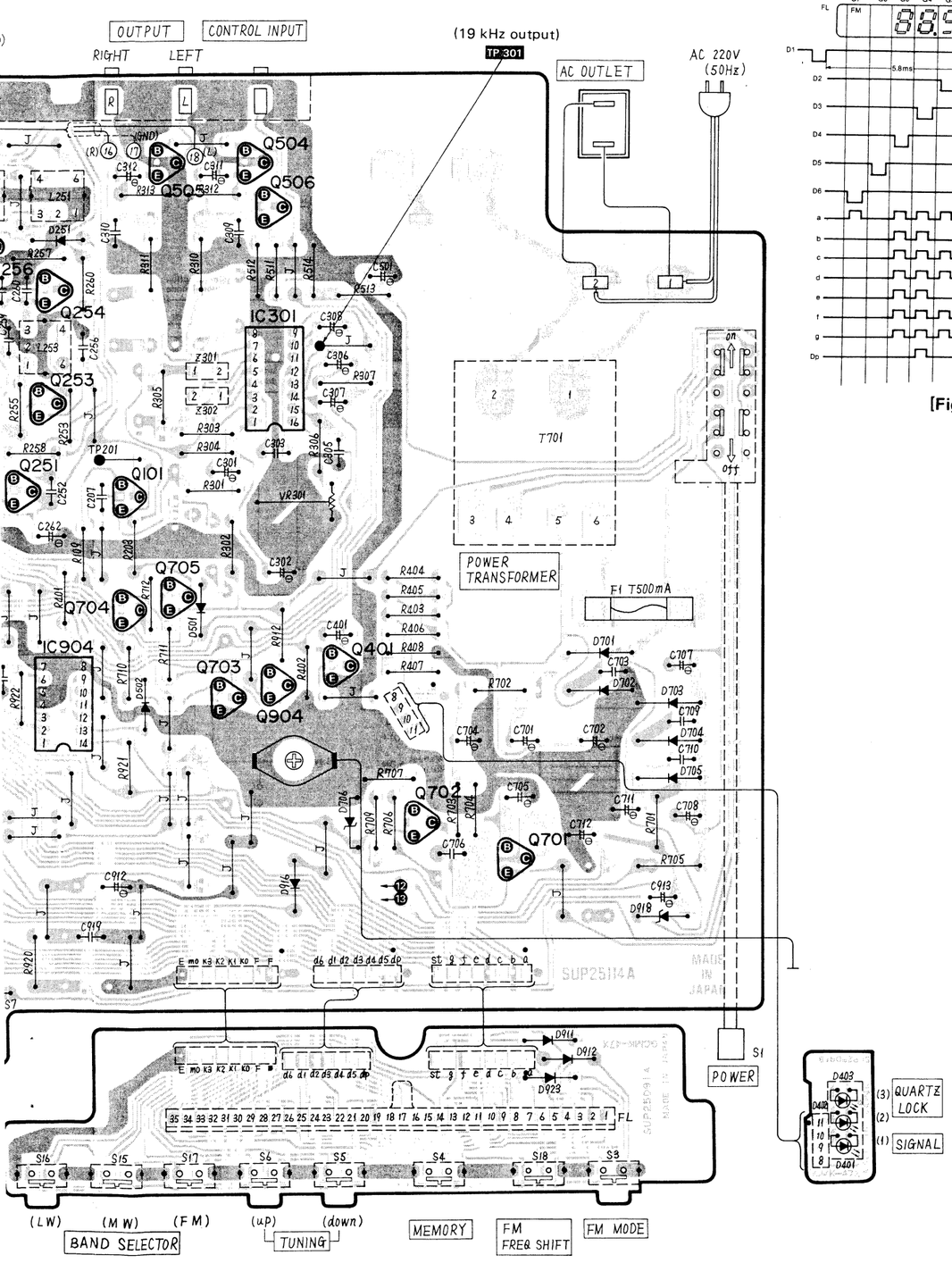


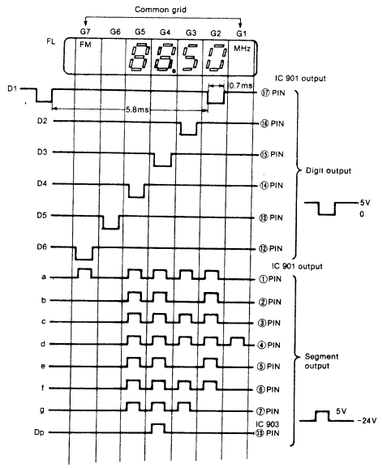
[Fig. 14]

■ TE

Pin No.
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25

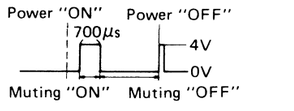
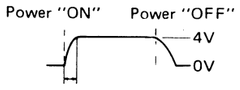
Ground (Earth) lines

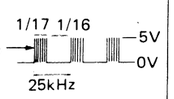
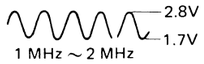




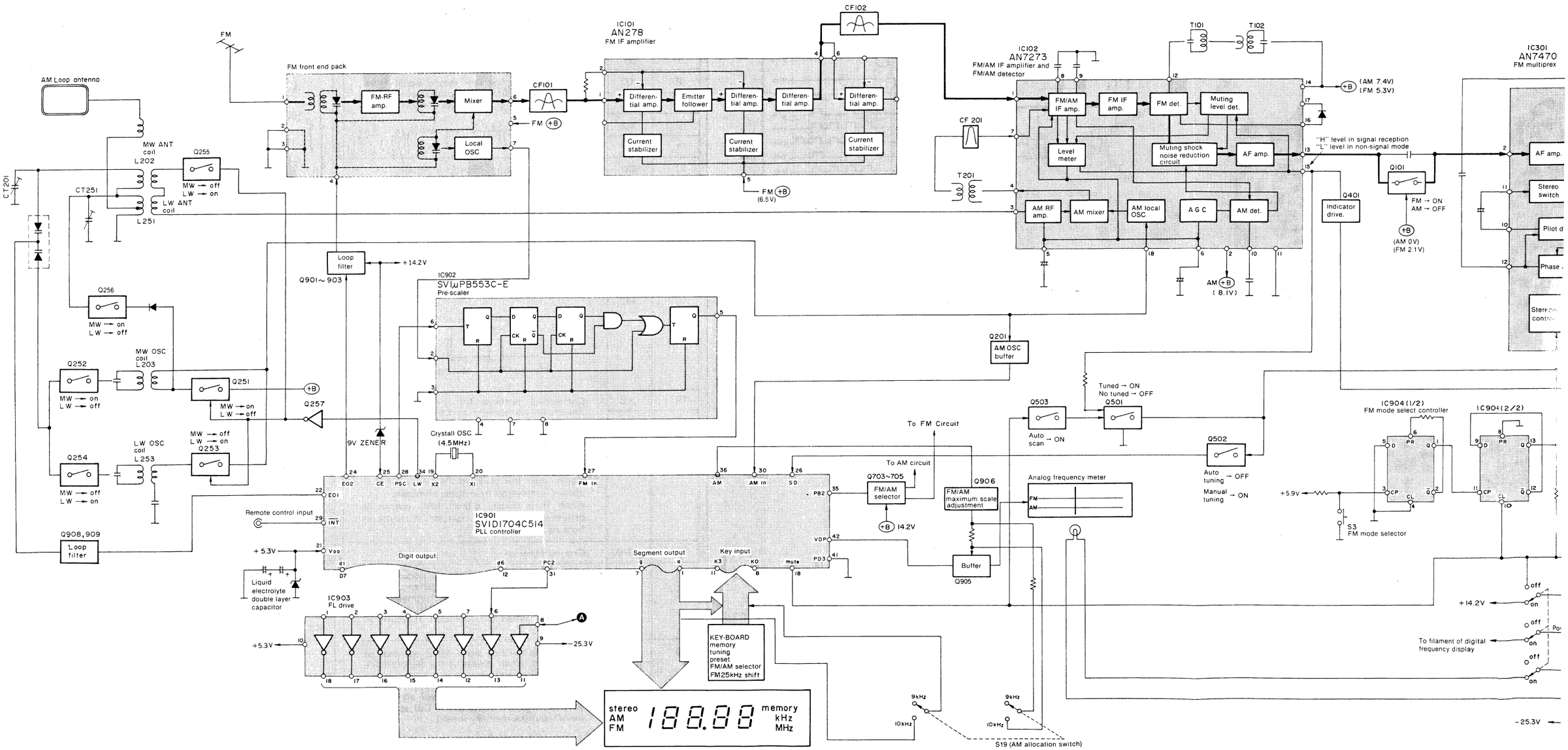
[Fig. 14]

■ TERMINAL OPERATION OF PLL CONTROLLER (IC901)

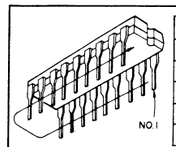
Pin No.	Mark	Description of terminal
1	Sa	Segment signal output terminal for display. (Refer to Fig. 14)
2	Sb	
3	Sc	
4	Sd	
5	Se	
6	Sf	
7	Sg	
8	K0	Input terminal for key return signal from external key matrix. The output of segment terminals (a ~ g) is used as the key return signal source.
9	K1	
10	K2	
11	K3	
12	D6	Digit signal output terminal for display. (Refer to Fig. 14)
13	D5	
14	D4	
15	D3	
16	D2	
17	D1	
18	MT	This is the output terminal to eliminate shock noise due to unlocking at PLL. When the CE terminal is at low level, the output from this terminal is at high level. 
19	X2	Connecting terminal for crystal oscillator. The crystal connected is at 4.5 MHz.
20	X1	
21	VDD	Power supply terminal of the device.
22	E01	When the divided oscillation frequency is higher than the standard frequency, H-level output is delivered from these terminals. When it is lower, L-level (0V) output is delivered. When they coincide, it results in floating.
23	GND	Ground terminal.
24	E02	When the divided oscillation frequency is higher than the standard frequency, H-level output is delivered from these terminals. When it is lower, L-level (0V) output is delivered. When they coincide, it results in floating.
25	CE	This is the selected signal input terminal of the device. When operating the device, make the level high, and when it is not used, make the level low. When this terminal is at low level, all the segment (a ~ g) and digits (D1 ~ D6) terminals are off, but the memory is held.  The device does not operate during this period.

Pin No.	Mark	Description of terminal
26	SD	This input terminal detects the reception of a broadcasting station. The voltage is 4.2V during reception, and otherwise 0V.
27	FM	Input terminal for FM OSC output frequency-divided to 1/16 or 1/17 by pre-scaler.
28	FSC	This is the terminal to deliver the frequency dividing ratio changeover output signal to the pre-scaler. The terminal continues to produce pulses at the rise of the signal applied to FM terminal (27) until the content of the inside swallow counter is 0. When the swallow counter comes to 0, the terminal level becomes low, then the frequency dividing ratio of pre-scaler is 1/16. Pules two times larger than the value that cannot be divided by VCO/16. 
29	INT	This is the interrupt demand signal input terminal. The signal from the control input terminal is put into this terminal, demanding for interruption, then the flow of program will be unconditionally shifted to the address No. 1.
30	AM	Input terminal for AM OSC output. 
31	PC2	This is 2-bit input/output port. PC2 terminal (31) is the decimal indication output terminal for the digital display.
32	PC3	
33	PB0	This is 4-bit input/output port. PB1 (㉞) terminal is the MW/LW selector output terminal, which is 5V in LW, and 0V in MW. PB2 (㉟) terminal is the FM/MW/LW selector output terminal, which is 5V in FM, and 0V in MW and LW. PB3 (㊱) terminal is the analog frequency meter selector output terminal, which is 5V in MW and LW, and 0V in FM.
34	PB1	
35	PB2	
36	PB3	
37	PA0	This is 4-bit input/output port. (Not used in this unit)
38	PA1	
39	PA2	
40	PA3	
41	PD3	One-bit input/output port. (Not used in this unit.)
42	VDP	One-bit output port. Output signal is emitted to operate the analog frequency meter, and the output voltage varies according to the frequency.

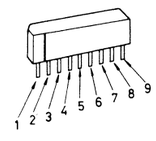
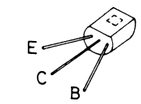
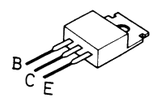
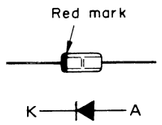
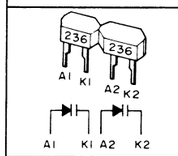
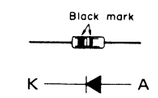
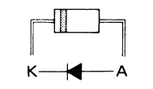
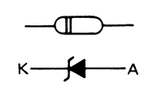
■ BLOCK DIAGRAM



• Terminal guide of transistors, diodes and IC's



AN7273 AN6873	18 pin
SVID1704C514	42 pin
SVIUPC1161C3	16 pin
SVITC4013BP	14 pin
SVIUPB553AC	8 pin

AN278	2SC1685, 2SA722
	
2SD762	MA27W–A
	
SVDKV1236Z	MA162A
	
SVDSR1K2	SVDMZ □□□□□
	

■ SCHEMATIC DIAGRAM

(This schematic diagram may be modified at any time with the development of new technology.)

* The part No. of transistors, IC and diodes mentioned in the schematic diagram stand for production part No. Regarding the part No. with ✪ mark, the production part No. are different from the replacement part No. Therefore, when placing an order for replacement part, please use the part No. in the replacement part list.

Note:

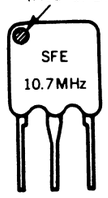
1. **S1** : Power source switch in "**on**" position.
2. **S3** : FM mode switch. (auto ⇄ mono)
3. **S4** : Memory set switch. (manual ⇄ auto memory)
4. **S5** : Tuning (down) switch. (manual ⇄ auto) [down : tuning to lower frequency]
5. **S6** : Tuning (up) switch. (manual ⇄ auto) [up : tuning to higher frequency]
6. **S7 ~ S14** : Preset tuning switch.
   (* With it **lightly** pushed (less than 0.4 sec.) and released, the 1 ~ 8 CH (front stations) are received.
   * With it continuously pushed (0.4 sec. or more) and released, the 9 ~ 16 CH (back stations) are received.)
7. **S15** : MW selector switch.
8. **S16** : LW selector switch.
9. **S17** : FM selector switch.
10. **S18** : FM/LW shift switch. (off ⇄ FM 25 kHz/LW 2 kHz)
11. **S19** : AM (MW) allocation switch in "**9 kHz step**" position.
    9 kHz step ⟷ 10 kHz step
12. Indicated voltage values are the standard values for the unit measured by the DC electronic circuit tester (high-impedance) with the chassis taken as standard. Therefore, there may exist some errors in the voltage values, depending on the internal impedance of the DC circuit tester.
    * Figures in ☐ stand for DC voltage in FM signal (no signal) reception mode.
    * Figures in ⌜ ⌟ stand for DC voltage in FM stereo signal reception mode.
    * Figures in ( ) stand for DC voltage in MW signal reception mode.
    * Figures in [ ] stand for DC voltage in LW signal reception mode.
13. ▬▬ Positive voltage lines ▒▒▒ AF signal lines
    ▭▭▷ FM signal ▭▭▷ FM IF
    ▬▬▶ AM signal ▬▬▶ AM IF
14. Important safety notice.
    Components identified by ⚠ mark have special characteristics important for safety. When replacing any of these components, use only manufacturer's specified parts.

• Use of ceramic filters in pairs

The ceramic filters (CF101, CF102) for FM-IF circuit are available in two ranks, For this machine, be sure to use the ceramics of the same rank in a pair.

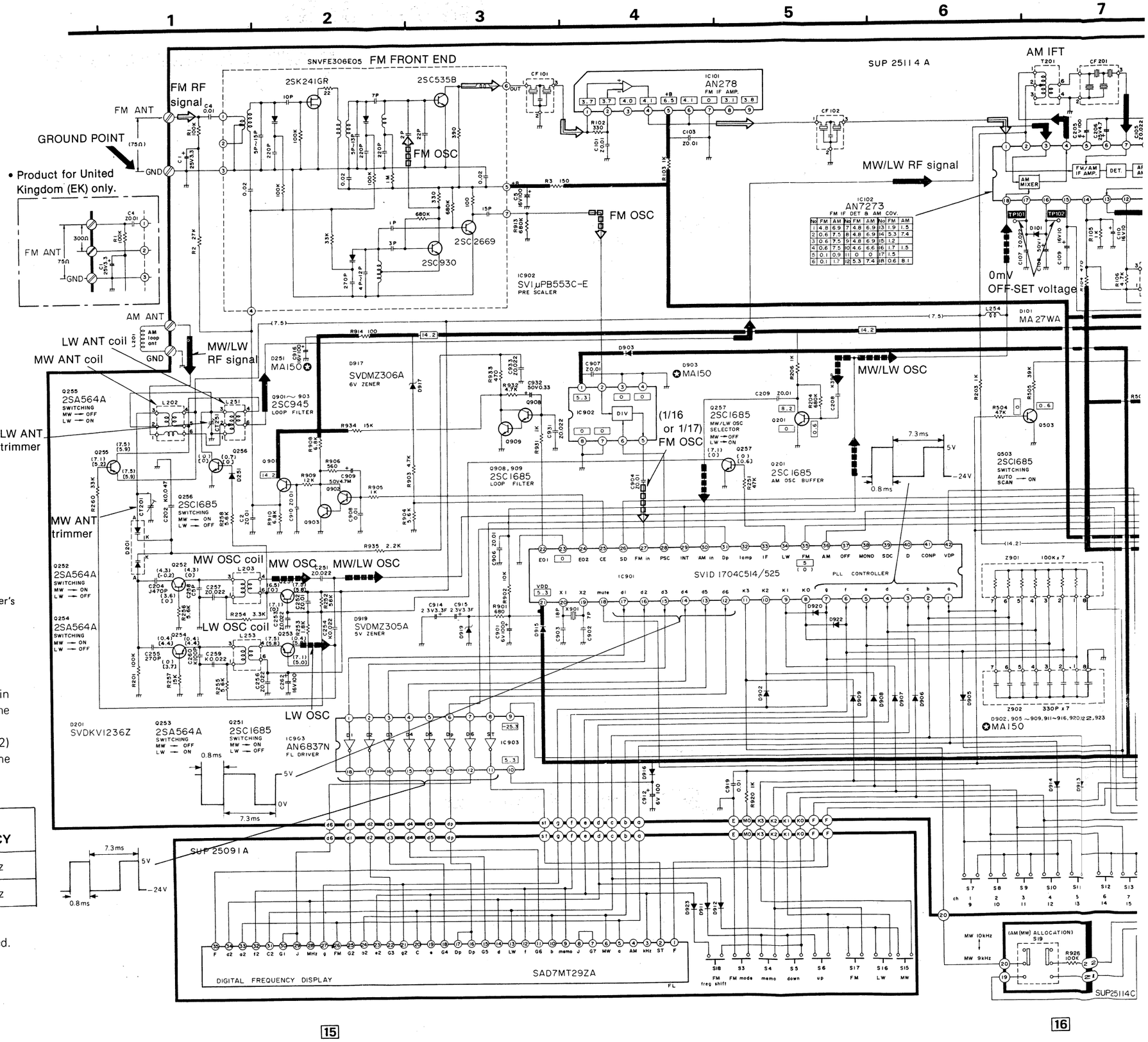
At repairing and replacement, pay close attention to the diode (D902) for use as different diodes must be used depending on each rank of the ceramic filters.

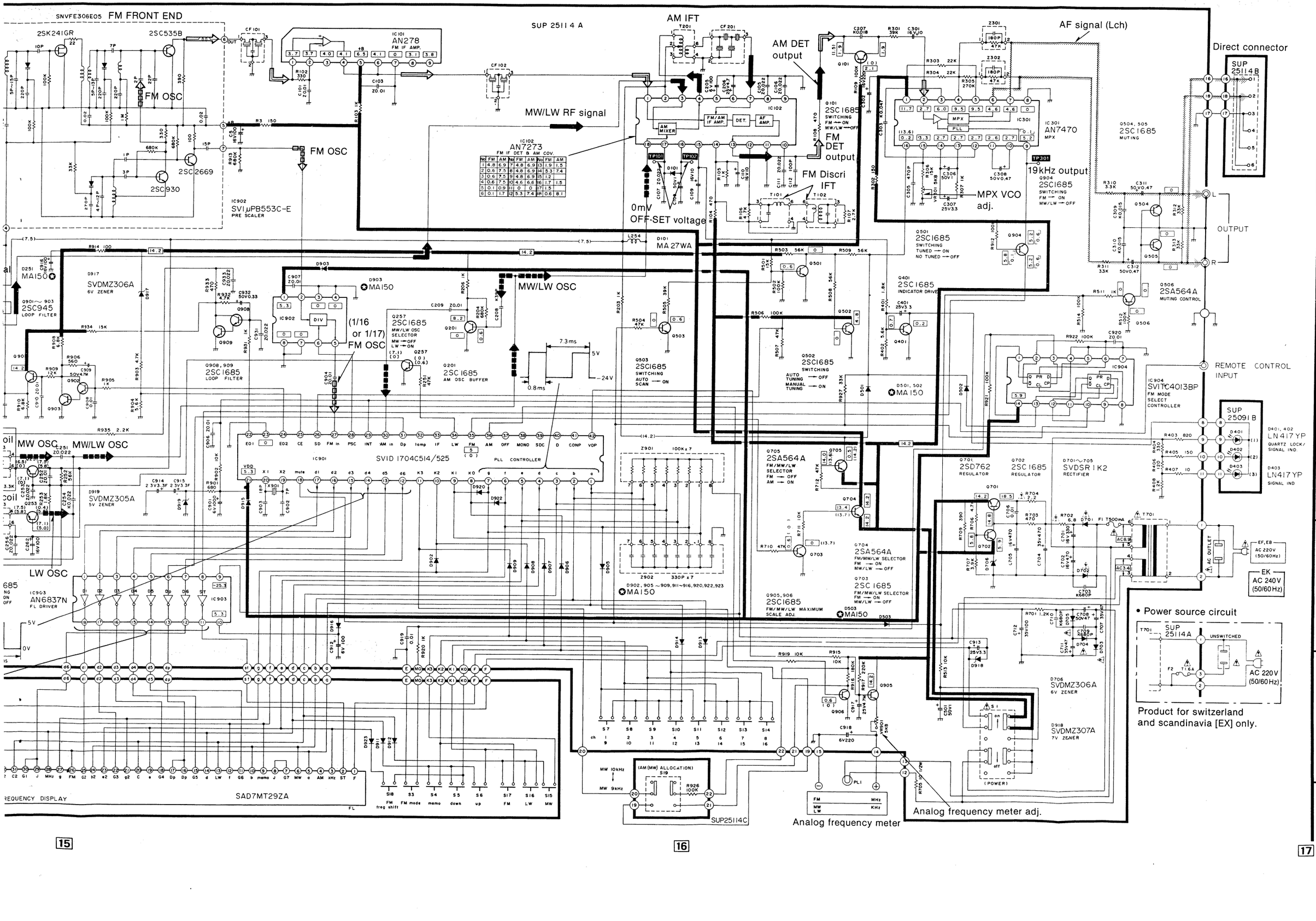
Color marking
(Red or Black)



RANK (Color)	D902	CENTER FREQUENCY
Red	X	10.70 MHz
Black	O	10.65 MHz

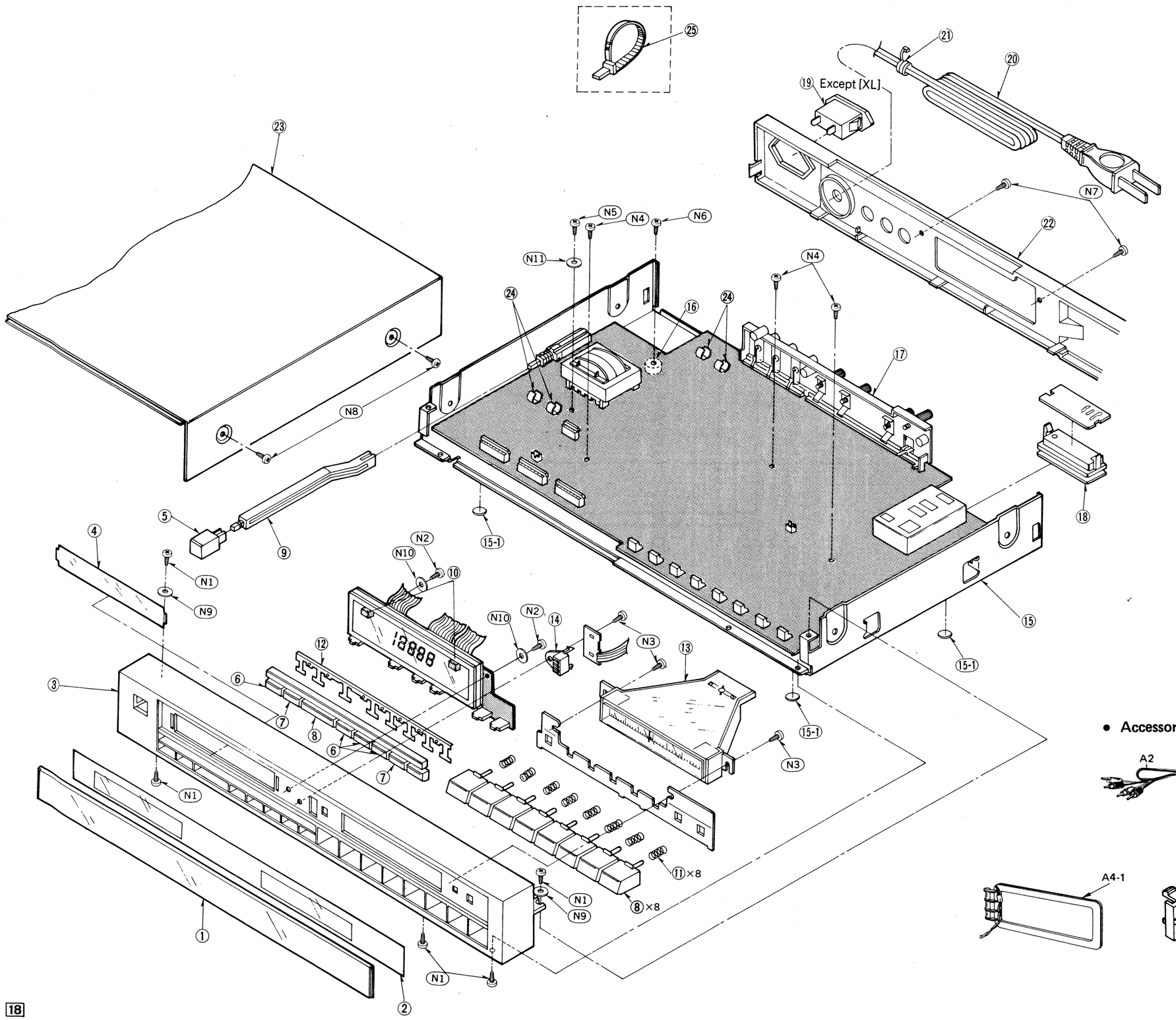
Note: O Mark Diode is used.
X Mark Diode is not used.




SNVFE306E05 FM FRONT END
2SK241GR
2SC535B
FM OSC
2SC2669
2SC930
IC902 SVIμPB553C-E PRE SCALER
SUP 25114 A
AM IFT
IC101 AN278 FM IF AMP.
IC102 AN7273 FM IF DET & AM COV.
MW/LW RF signal
AM DET output
FM DET output
FM Discri IFT
0mV OFF-SET voltage
Q101 2SC1685 SWITCHING FM → ON MW/LW → OFF
IC301 AN7470 MPX
AF signal (Lch)
Direct connector
SUP 25114 B
19kHz output
MPX VCO adj.
Q504, 505 2SC1685 MUTING
Q904 2SC1685 SWITCHING FM → ON MW/LW → OFF
OUTPUT
D101 MA27WA
Q501 2SC1685 SWITCHING TUNED → ON NO TUNED → OFF
Q401 2SC1685 INDICATOR DRIVE
Q506 2SA564A MUTING CONTROL
D251 MA150
D917 SVDMZ306A 6V ZENER
Q901~903 2SC945 LOOP FILTER
MW/LW OSC
(1/16 or 1/17) FM OSC
Q257 2SC1685 MW/LW OSC SELECTOR MW → OFF LW → ON
Q201 2SC1685 AM OSC BUFFER
Q908, 909 2SC1685 LOOP FILTER
Q503 2SC1685 SWITCHING AUTO SCAN → ON
Q502 2SC1685 SWITCHING AUTO TUNING → OFF MANUAL TUNING → ON
D501, 502 MA150
IC904 SVITC4013BP FM MODE SELECT CONTROLLER
REMOTE CONTROL INPUT
SUP 25091 B
D401, 402 LN417YP QUARTZ LOCK/ SIGNAL IND.
D403 LN417YP SIGNAL IND
IC901 SVID 1704C514/525 PLL CONTROLLER
Z901 100K x 7
Z902 330P x 7
D902, 905 ~ 909, 911 ~ 916, 920, 922, 923 MA150
Q705 2SA564A FM/MW/LW SELECTOR FM → OFF AM → ON
Q704 2SA564A FM/MW/LW SELECTOR FM → ON MW/LW → OFF
Q703 2SC1685 FM/MW/LW SELECTOR FM → ON MW/LW → OFF
Q905, 906 2SC1685 FM/MW/LW MAXIMUM SCALE ADJ.
D503 MA150
Q701 2SD762 REGULATOR
Q702 2SC1685 REGULATOR
D701~705 SVDSR1K2 RECTIFIER
D706 SVDMZ306A 6V ZENER
D918 SVDMZ307A 7V ZENER
T701 SUP 25114 A
EF, EB AC 220V (50/60Hz)
EK AC 240V (50/60Hz)
• Power source circuit
Product for switzerland and scandinavia [EX] only.
IC903 AN6837N FL DRIVER
SAD7MT29ZA
FREQUENCY DISPLAY
FL
SUP25114C
(AM(MW) ALLOCATION) S19
MW 10kHz ↑ MW 9kHz
Analog frequency meter
Analog frequency meter adj.
7.3ms
0.8ms
5V
24V

15 16 17

■ EXPLODED VIEWS



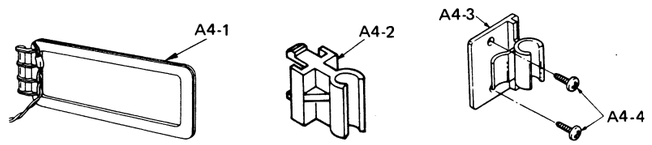
■ REPLA

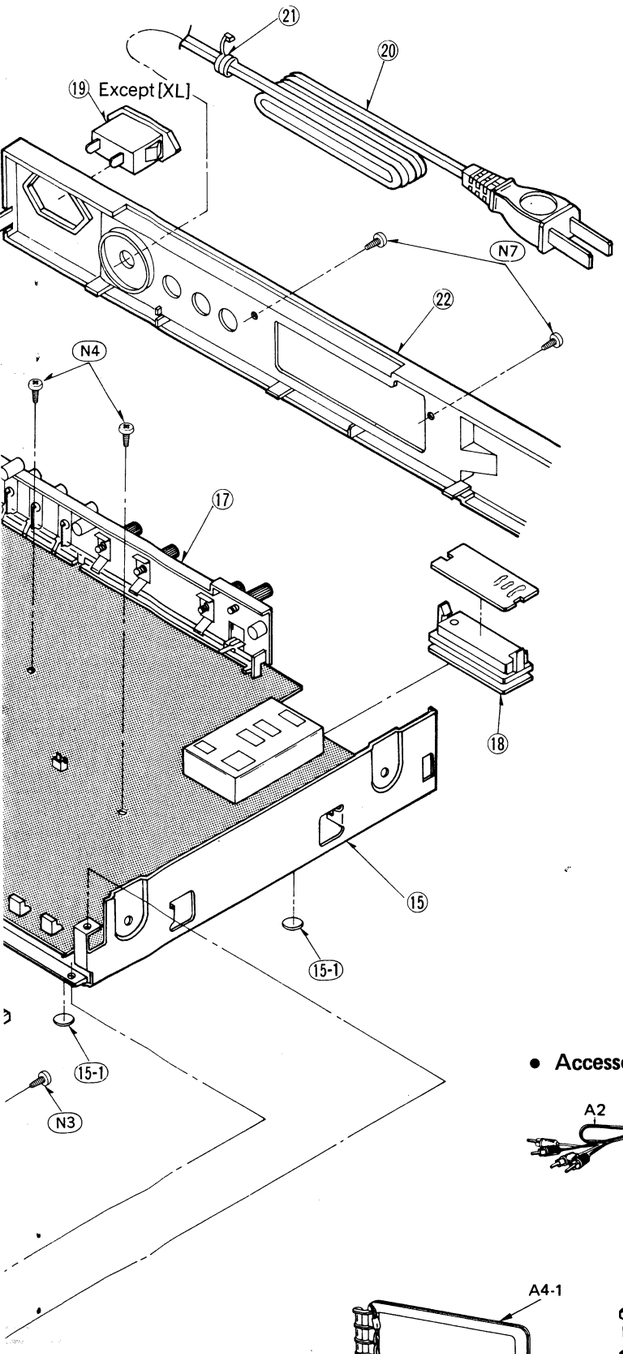
Notes: 1. Part n
Please
2. Impor
Comp
charac
When
manu
3. K -
O-mar
4. Part c
both b

Ref. No.	Part No.	Description
INTEGRATED CIRCUITS		
IC101	AN278	FM IF Amplifier
IC102	AN7273	FM IF Amplifier FM/AM Detector
IC301	SVIUPC1161C3	FM MPX (Product Part No. is AN7470)
IC901	SVID1704C525	PLL Controller
IC902	SVIUPB553AC	Pre–Scaler
IC903	AN6873N	FL Driver
IC904	SVITC4013BP	FM Mode Select Controller
TRANSISTORS		
Q101, 201 S	2SC1685–S	Switching, AM OSC Buffer
Q251 S	2SC1685–S	Switching, MW/LW OSC Controler
Q252 ~ 255 S	2SA722–S	Switching, MW/LW OSC Controler
Q256, 257 S	2SC1685–S	Switching, MW/LW OSC Controler
Q401 S	2SC1685–S	Indicators Drive
Q501 ~ 505 S	2SC1685–S	Muting Switching
Q506 S	2SA722–S	Muting Control (Product Part No. is 2SA564A)
Q701	2SD762–O	Regulator
Q702, 703 S	2SC1685–S	Regulator FM/AM Selector Control
Q704, 705 S	2SA722–S	FM/AM Selector Control (Product Part No. is 2SA564A)
Q901 ~ 903 S	2SC945–Q	Loop Filter
Q904 ~ 906 S	2SC1685–S	FM/MW/LM Maximum Scale Adj. and Counter Flow Prevention
Q908, 909 S	2SC1685–S	Loop Filter

Ref. No.	
DIODES	
D101	MA
D201	SV
D251	MA
D501 ~ 503	MA
D701 ~ 705 △	SVI
D706	SVI
D902, 903	MA
D905 ~ 909	MA
D911 ~ 916	MA
D917	SVI
D918	SVI
D919	SVI
D920	MA
D922, 923	MA
COILS	
L202	S
L203	S
L251	S
L253	S
L254	SL
TRANSFORMERS	
T101	SL
T102	SL
T201	SL
T701 △	SL
T701 [EK] only △	SL
CERAMIC FILTERS	
CF101, 102	SV
	SV
	SV
CF201	SV (Us an
VARIABLE CAPAC	
CT201	SV
CT251	SV
VARIABLE RESIST	
VR301 S	EV
VR901	EVI
COMPONENT COM	
Z301, 302	EXI
Z901	EXI
Z902	EXI
CRYSTAL	
X901	SVC

- **Accessories**





■ REPLACEMENT PARTS LIST

Notes:
1. Part numbers are indicated on most mechanical parts. Please use this part number for parts order.
2. Important safety notice:
   Components identified by ⚠ mark have special characteristics important for safety.
   When replacing any of these components, use only manufacturer's specified parts.
3. [K]-marked parts are used for black only, while ○-marked parts are for silver type only.
4. Part other than [K] -and ○-marked are used for both black and silver type.
5. Bracketed indications in Ref. No. columns specify the area. Parts without these indications can be used for all areas.
6. The "**S**" mark is service standard parts and may differ from production parts.
7. The parenthesized numbers in the column of description stand for the quantity pre set.

Black type model No. : ST-5L (K)

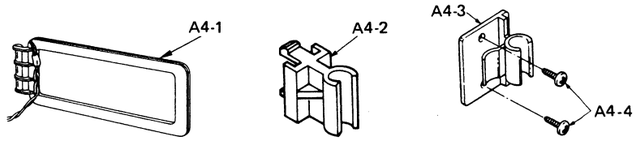
Ref. No.		Part No.	Description
INTEGRATED CIRCUITS			
IC101		AN278	FM IF Amplifier
IC102		AN7273	FM IF Amplifier FM/AM Detector
IC301		SVIUPC1161C3	FM MPX (Product Part No. is AN7470)
IC901		SVID1704C525	PLL Controller
IC902		SVIUPB553AC	Pre–Scaler
IC903		AN6873N	FL Driver
IC904		SVITC4013BP	FM Mode Select Controller
TRANSISTORS			
Q101, 201	**S**	2SC1685–S	Switching, AM OSC Buffer
Q251	**S**	2SC1685–S	Switching, MW/LW OSC Controler
Q252 ~ 255	**S**	2SA722–S	Switching, MW/LW OSC Controler
Q256, 257	**S**	2SC1685–S	Switching, MW/LW OSC Controler
Q401	**S**	2SC1685–S	Indicators Drive
Q501 ~ 505	**S**	2SC1685–S	Muting Switching
Q506	**S**	2SA722–S	Muting Control (Product Part No. is 2SA564A)
Q701		2SD762–O	Regulator
Q702, 703	**S**	2SC1685–S	Regulator FM/AM Selector Control
Q704, 705	**S**	2SA722–S	FM/AM Selector Control (Product Part No. is 2SA564A)
Q901 ~ 903	**S**	2SC945–Q	Loop Filter
Q904 ~ 906	**S**	2SC1685–S	FM/MW/LM Maximum Scale Adj. and Counter Flow Prevention
Q908, 909	**S**	2SC1685–S	Loop Filter

Ref. No.		Part No.	Description
DIODES			
D101		MA27W–A	Switching
D201		SVDKV1236Z	MW/LW Variable Capacitor
D251		MA162A	Switching
D501 ~ 503		MA162A	Switching
D701 ~ 705	⚠	SVDSR1K2	Rectifier
D706		SVDMZ306A	6V, Zener
D902, 903		MA162A	Switching
D905 ~ 909		MA162A	Switching
D911 ~ 916		MA162A	Switching
D917		SVDMZ306A	6V, Zener
D918		SVDMZ307A	7V, Zener
D919		SVDMZ305A	5V, Zener
D920		MA162A	Switching
D922, 923		MA162A	Switching
COILS			
L202		SLA2C7–P	MW Antenna
L203		SLO2C31R–P	MW OSC
L251		SLA1C15R–P	LW Antenna Coil
L253		SLO1C17–P	LW OSC Coil
L254		SLQX101–3M	Choke Coil
TRANSFORMERS			
T101		SLI4C535–Z	FM IFT
T102		SLI4C537–Z	FM IFT
T201		SLI2C141–M	AM IFT
T701	⚠	SLT5K135	Power Source
T701 [EK] only	⚠	SLT5K137	Power Source
CERAMIC FILTERS			
CF101, 102		SVFE107MM–A	FM, 10.700 MHz (Red)
		SVFE107MM–B	FM, 10.675 MHz (Blue)
		SVFE107MM–C	FM, 10.725 MHz (Orange)
CF201		SVFSFP450HT (Use pair ranks as and CF102)	AM, 450 kHz same as CF101
VARIABLE CAPACITORS			
CT201		SVCTZ03T110F	MW Antenna
CT251		SVCTZ03R200F	LW Antenna
VARIABLE RESISTORS			
VR301	**S**	EVTS3MA00B53	FM MPX VCO Adjustment 5kΩ
VR901		EVN58AA00B53	Analog Frequency Meter Adj.
COMPONENT COMBINATIONS			
Z301, 302		EXRP181K473C	180pF x 1 47kΩ x 1
Z901		EXBP87104K	100kΩ x 7
Z902		EXFP7331MW	331pF x 7
CRYSTAL			
X901		SVQ43U452	4.5 MHz Counter Oscillator

Ref. No.		Part No.	Description
FLUORESCENT DISPLAY TUBE			
FL		SAD7MT29ZA	
FUSE			
F1	⚠	XBA2C05TR0	250V, T500mA
F2 [EX] only	⚠	XBA2C16TR0	250V, T1.6A
SWITCHES			
S1	⚠	SSH1069	Power Source
S3 ~ 6, 15, 16		SSG17	FM Mode, Memory Set, Tuning and FM/AM Selector
S7 ~ 14		SSG15	Pre Set Tuning
S19		SSS43	AM Allocation Selection
FRONT END			
		SNVFE306E05	P.C.B. Ass'y (Front End)
CABINET and CHASSIS PARTS			
1	○	SGU289–2	Transparent Panel (Silver) (1)
1	[K]	SGU289–5	Transparent Panel (Black) (1)
2	○	SKD4432	Tinted Plate (Silver) (1)
2	[K]	SKD4436	Tinted Plate (Black) (1)
3	○	SGWT5LE	Panel, Front Ass'y (Silver) (1)
3	[K]	SGWT5LKE	Panel, Front Ass'y (Black) (1)
4		SDU89–1	Filter, FL (1)
5		SBC489	Button (1)
6	○	SBC507	Button (Silver) (7)
6	[K]	SBC507–2	Button (Black) (7)
7	○	SBC509	Button (Silver) (1)
7	[K]	SBC509–1	Button (Black) (1)
8	○	SBC505–1	Button (Silver) (8)
8	[K]	SBC505–2	Button (Black) (8)
9		SUB111–1	Connection Rod, Power Switch (1)
10		SHG1545–1	Rubber FL (2)
11		SUS163	Spring (8)
12		SUS273	Spring (2)
13		SSM175–2	Meter (1)
14		LN03480P	L.E.D. (With Holder, Diode No. is LN417YPX3) (1)
15[EX]		SKUT5LE	Chassis Ass'y (W/Feet) (1)
15[EK]		SKUT5LK	Chassis Ass'y (W/Feet) (1)
15[EF,EB]		SKUT5LF	Chassis Ass'y (W/Feet) (1)
15–1		SKL245–2	Foot (4)
16		SHE129–1	Holder (1)
17		SJF8705–1N	Terminal Board (1)
17[EK] only		SJF8801N	Terminal Board (1)

Ref. No.		Part No.	Description
18		SJS9605	Socket, Derect Connector (1)
19	⚠	SJS9225	Socket (1)
19[EK] only	⚠	SJS9227	Socket (1)
20	⚠	SJA151	AC Cord (1)
20[EK] only	⚠	SJA149	AC Cord (1)
21		SHR127	Bushing, AC Cord (1)
22		SGP3211–2A	Panel, Rear (1)
22[EK] only		SGP3211–3A	Panel, Rear (1)
23	○	SKCT5N	Cabinet (Silver) (1)
23	[K]	SKCT5KE	Cabinet (Black) (1)
24		SJT347	Terminal, Fuse (4)
25		SHR301	Clamper (2)
SCREWS			
N1	**S**	XTB3+8BFZ	Tapping, (3) x 8 (5)
N2	**S**	XTB3+8BFN	Tapping, (3) x 8 (2)
N3		XTB3+10BFN	Tapping, (3) x 10 (3)
N4		XTBS3+8BFN	Tapping, (3) x 8 (3)
N5	**S**	XTB3+8BFN	Tapping, (3) x 8 (1)
N6	**S**	XTB3+14BFN	Tapping, (3) x 14 (1)
N7	**S**	XTB3+8BFZ	Tapping, (3) x 8 (2)
N8		SNE2095–2	Screw (4)
WASHERS			
N9	**S**	XWC3	With Detent, φ3 (2)
N10	**S**	XWG3	Plain, φ3 (2)
N11	**S**	XWG3	Plain, φ3 (1)
PACKING PARTS			
P1[EX, EB]	○	SPG4057	Carton Box (Silver) (1)
P1[EX]	[K]	SPG4089	Carton Box (Black) (1)
P1[EK]	○	SPG4059	Carton Box (Silver) (1)
P1[EK]	[K]	SPG4141	Carton Box (Black) (1)
P1[EF]		SPG4061	Carton Box (1)
P2		SPS3779–1	Pad, Front (1)
P2 [EK] only		SPS3781	Pad, Front (1)
P3		SPS3693–2	Pad, Left (1)
P3[EK] only		SPS3693–3	Pad, Left (1)
P4		SPS3695–2	Pad, Right (1)
P4[EK] only		SPS3695–3	Pad, Right (1)
P5		SPP691–1	Polyethylene Bag (1)
ACCESSORIES			
A1		SQF11397	Instructions Book (1)
A1 [EK] only		SQF11399	Instructions Book (1)
A2		SJP2241–1	Cord Connection (1)
A3		SSA267	Cord, Indoor Antenna (1)
A4		SPB869–3	Loop Antenna Ass'y (1)
A4–1		SSA605–1	Loop Antenna (1)
A4–2		SMA235–1	Holder (1)
A4–3		SMA233–1	Holder (1)
A4–4		XTN3+10AFZ	Screw (2)

• Accessories



Printed in Japan
82065000 Ⓗ YK/IM

ORDER NO. SD82062221C2-A

QUARTZ Synthesizer
FM/MW/LW Stereo Tuner

ST-5L/ST-5L(K)

*This booklet contains the specifications and adjusting procedures for ST-5L, written in Germany and French.
*File this manual together with the ST-5L service manual (Order No. SD82062221C2.).

DEUTSCH

■ TECHNISCHE DATEN

(Spezifikationen können infolge von Verbesserungen ohne Ankündigung geändert werden.)

(DIN 45 500)

■ UKW-TUNERTEIL

Wellenbereich	87,50 ~ 108,00 MHz
Eingangsempfindlichkeit	1,0 μV (nutzbar nach IHF)
S/R 30 dB	1,0 μV (75 Ω)
S/R 26 dB	0,9 μV (75 Ω)
S/R 20 dB	0,8 μV (75 Ω)
Stereoumschaltschwelle bei 46 dB nach IHF	22,0 μV/75 Ω
Gesamtklirrfaktor	
Mono	0,08%
Stereo	0,15%
Geräuschabstand	
Mono	70 dB (78 dB nach IHF)
Stereo	65 dB (73 dB nach IHF)
Frequenzgang	20 Hz ~ 15 kHz. +0,5 dB ~ −1,5 dB
Trennschärfe bei Störsender	
normal ±400 kHz	65 dB
Einfangverhältnis	1,0 dB
Spiegelfrequenz-Dämpfung bei 98 MHz	55 dB
ZF-Dämpfung bei 98 MHz	80 dB
Ansprechdämpfung auf Nebenfrequenzen bei 98 MHz	80 dB
AM-Unterdrückung	55 dB
Übersprechdämpfung	
1 kHz	40 dB
10 kHz	30 dB
Trägerrest	
19 kHz	−30 dB (−35 dB nach IHF)
38 kHz	−45 dB (−50 dB nach IHF)
Kanalabweichung (250 Hz ~ 6300 Hz)	±1,0 dB
Begrenzereinsatz	1,9 μV
Bandbreite	
ZF-Verstärker	180 kHz
UKW-Demodulator	1000 kHz
Antennenanschluß	75 Ω (unsymmetrisch)

■ AM-TUNERTEIL

Wellenbereiche	
MW	522 ~ 1611 kHz (9-kHz-Shritte)
	530 ~ 1620 kHz (10-kHz-Shritte)
LW	153 ~ 353 kHz (9-kHz-Shritte)
Eingangsempfindlichkeit (S/R 20 dB)	
MW	20 μV, 300 μV/m
LW	50 μV
Trennschärfe (±9 kHz)	
MW	55 dB
LW	55 dB
Spiegelfrequenz-Dämpfung bei 999 kHz	
MW	40 dB
LW (bei 254 kHz)	40 dB
ZF-Dämpfung bei 999 kHz	
MW	65 dB
LW (bei 254 kHz)	35 dB

■ ALLGEMEINE DATEN

Ausgangsspannung	0,6 V
Leistungsaufnahme	9W
Netzspannung	Wechselstrom 50 Hz/60 Hz, 220V
Abmessungen (B×H×T)	315 × 50 × 244 mm
Gewicht	2,0 kg

■ MESSUNGEN UND JUSTIERUNGEN

AM (MW)-EINSTELLUNG

• **Stellungen und zu benutzende Geräte**

1. Elektronische Voltmeter für Wechsel- und Gleichstrom (VTVM)
2. AM (MW)-Meßsender (AM-SG)
3. Bereichsschalter ..... {MW (MW Abgleich) / LW (LW Abgleich)}
4. AM (MW) Wellenverteilungs-Wahlschalter auf Position "9 kHz" stellen.
5. Netzspannung auf ihren Sollwerthalten.
6. Der Ausgang des Meßsenders darf nicht höher sein als unbedingt notwendig für eine gute ablesung.
7. Einen nichtmetallischen Schraubenzieher für die Einstellungen verwenden.

Nr.	AM (MW)-MESSENDER ANSCHLUSS	AM (MW)-MESSENDER FREQUENZ	ANZEIGE-FREQUENZ DURCH VOR-EINSTELLUNG	VORBEREITUNG	ABGLEICHSPUNKTE	ABGLEICHSVERFAHREN
	MW-HF-ABGLEICH					
1	Einen MW-Signal-generator über einen 200pF Kondensator mit dem MW-Antenne-neingang verbinden. Die gemeinsame Leitung mit dem Chassis verbinden. (Schwacher Eingang)	612 kHz (400 Hz Modulat., 30%)	612 kHz	Oszilloskop oder Wechselstrom-Volt-meter an Ausgangs-klemme (OUTPUT) Schließen.	L202 (Ant. Spule)	1. Auf max. Ausgang abgleichen 2. Den Ferritkern von L202 mit einem Schraubendreher justieren.
2		1503 kHz (400 Hz Modulat., 30%)	1503 kHz		CT201 (Ant. Trimmer)	1. Auf max. Ausgang abgleichen. 2. Die Schritte (1) und (2) wied-erholen, bis die Frequenz genau mit der Skalenanzeige übereinstimmt.
	LW-HF-ABGLEICH					
3	Einen MW-Signal-generator über einen 200pF Kondensator mit dem MW-Antenneneingang verbinden. Die gemeinsame Leitung mit dem Chassis verbinden. (Schwacher Eingang)	155 kHz (400 Hz Modulat., 30%)	155 kHz	Oszilloskop oder Wechselstrom-Volt-meter an Ausgang Klemme (OUTPUT) schließen.	L253 (Osc. Spule)	1. Auf max. Ausgang abgleichen. 2. Den Ferritkern von L253 mit einem Schraubendreher justieren.
4		353 kHz (400 Hz Modulat., 30%)	353 kHz		CT251 (Ant. Trimmer)	1. Auf max. Ausgang abgleichen. 2. Die Schritte (3) und (4) wiederholen, bis die Frequenz genau mit der Skalenanzeige übereinstimmt.

FM (UKW)-EINSTELLUNG

- **Stellungen und zu benutzenden Geräte**

1. UKW-Meßsender (FM-SG)
2. Verzerrungsmesser
3. Elektronische Voltmeter für Wechsel-und Gleichstrom (VTVM)
4. Signalfrequenzmesser (meßar für 19 kHz und 108 MHz)
5. UKW 75-Ohm Kunstantenne (Abb. 10)
6. Bereichsschalter . . . . . FM
7. Den UKW-Betriebsartenschalter auf die "mono"-position stellen.
8. Die anderen Einstellungen sind gleich wie beider MW-Justierung.
9. Stereo-Modulator (oder Trennmesser)

- **Vorbereitung AM UKW-Messender (FM-SG)**

1. SG-Ausgang über 300-Ohm UKW Kunstantenne an den Antennen-eingang des Gerätes schließen.
2. Der normale Eingang des Gerätes beträt 60 dB (1mV), 400Hz 100% Modulation. (Wegen Verwendung der Kunstantenne muß der Signalausgang 12 dB plus (IHF) sein: d.h. beim Eingang von 60 dB soll der Signalausgang 72 dB sein.)

Nr.	FM (UKW) MESSENDER ANSCHLUSS	FM (UKW) MESSENDER FREQUENZ	ANZEIGE-FREQUENZ DURCH VOR-EINSTELLUNG	VORBEREITUNG	ABGLEICHSPUNKTE	ABGLEICHSVERFAHREN
	ABGLEICH AUF MIN. VERZERRUNG IN STELLUNG UKW-MONO					
5	Meßsender über eine Kunstantenne an den UKW-Antennen-eingang schließen. (60 dB in den Antenneneingang leiten.)	Kein Signal	100.1 MHz	Ein Gleichstromrören-voltmeter zwishen TP101 und TP102 über eine Drosselspule verbinden. (Siehe Abb. 11)	T101 (Diskriminator FT)	1. Den Kern von T101 so justieren, daß die gemessene Spannung im signallosen Modus 0mV im 300mV Bereich beträgt.
6		100.1 MHz (400 Hz Modulat., 100%)	100.1 MHz	Klirrfaktor-Meßbrücke an Ausgangsklemme (OUTPUT) schließen.	T102 (Diskriminator FT)	1. T102 Kern für minimale Verzerrung der rechten und linken Kanäle justieren.
	UKW-MPX-PILOTABGLEICH (VCO)					
7	Meßsender über eine Kunstantenne an den UKW-Antennen-eingung schließen. (Mono-Signal)	100.1 MHz (modulierte Welle)	100.1 MHz	Den Signalfrequenz-messer durch 100kΩ Widerstand an Anschluß TP301 anschließen.	VR301 (VCO)	1. Den UKW-Betriebsarten-schalter auf die "auto"-position stellen. 2. VR301 so abgleichen, daß Ausgangsfrequenz von TP301 19 kHz ± 30 Hz.
	UKW-ANALOG-FREQUENZMESSER					
8	———	Kein Signal	108.0 MHz	———	VR901 (Frequenzmesser)	1. VR910 so sbgleichen, daß der Frequenzmesser 108.0 MHz anzeigt. (Siehe Abb. 12) 2. Anschließend den Sender-abstimmknopf so einstellen, daß die Digital-Frequenz-anzeige 88.1 MHz und 100.1 MHz anzeigt. Dann überprüfen, daß der Anzeiger mit jedem Buchstaben in Berührung ist. 3. Falls die Anforderung in Schritt 2 nicht erfüllt wird, Schritt 1 erneut durchführen und den Anzeiger innerhalb die gestrichelte Linie in Abb. 12 einstellen.

FRANÇAIS

■ CARACTERISTIQUES (Sujet à changement sans préaris.)

(DIN 45 500)

■ SECTION SYNTONISATEUR FM

Gamme de fréquence	87,50~108,00 MHz
Sensibilité	1,0 μV (IHF utilisable)
S/B 30 dB	1,0 μV (75Ω)
S/B 26 dB	0,9 μV (75Ω)
S/B 20 dB	0,8 μV (75Ω)
Sensibilité stéréo au seuil de 46 dB, IHF	22,0 μV/75Ω
Distorsion harmonique totale	
MONO	0,08%
STEREO	0,15%
Signal/Bruit	
MONO	70 dB (78 dB, IHF)
STEREO	65 dB (73 dB, IHF)
Réponse de fréquence	20 Hz~15 kHz, +0,5 dB~ −1,5 dB
Sélectivité alternée par canal	
normal ±400 kHz	65 dB
Taux de capture	1,0 dB
Rejection d'image à 98 MHz	55 dB
Rejection FI à 98 MHz	80 dB
Rejection de réponse parasite à 98 MHz	80 dB
Suppression AM	55 dB
Séparation stéréophonique	
1 kHz	40 dB
10 kHz	30 dB
Fuite de porteuse	
19 kHz	−30 dB (−35 dB, IHF)
38 kHz	−45 dB (−50 dB, IHF)
Equilibrage de canaux (250 Hz~6,300 Hz)	±1,0 dB
Point de limite	1,9 μV
Largeur de bande	
Amplificateur FI	180 kHz
Démodulateur FM	1000 kHz
Bornes d'antenne	75Ω (asymétrique)

■ SECTION SYNTONISATEUR AM

Gamme de fréquence	
PO (MW)	522~1611 kHz (9 kHz par palier)
	530~1620 kHz (10 kHz par palier)
GO (LW)	153~353 kHz (9 kHz par palier)
Sensibilité (S/B 20 dB)	
PO (MW)	20 μV, 300 μV/m
GO (LW)	50 μV
Sélectivité (±9 kHz)	
PO (MW)	55 dB
GO (LW)	55 dB
Réjection d'image à 999 kHz	
PO (MW)	40 dB
GO (LW) (à 254 kHz)	40 dB
Réjection FI à 999 kHz	
PO (MW)	65 dB
GO (LW) (à 254 kHz)	35 dB

■ DIVERS

Tension de sortie	0,6 V
Consommation	9W
Alimentation	CA 50 Hz/60 Hz, 220V
Dimensions (L×H×Pr)	315 × 50 × 244 mm
Poids	2,0 kg

■ MESURAGES ET RÉGLAGES

REGLAGE DE AM

- **Réglage et équement utilisé**
1. Voltmètres électronique de courant altèrnatif et de courant continu (VTVM)
2. Générateur du signal AM (AM-SG)
3. Sélecteur de gamme .... {MW (Alignement MW) / LW (Alignement LW)}
4. Régler le sélecteur d'attribution AM(MW) sur la position "1O kHz".
5. Conservel la tension du secteur à la tension nominale.
6. Le signal du générateur ne doit pas être plus élevé qu'il n'est nécessaire à obtenir une lecture en sortie.
7. Utiliser un tournevis non-métallique pour la réglage.

No.	AM GENERATEUR		FREQUENCE D'AFFICHAGE PAR PREREGLAGE	PREPARATIONS	ELEMENTS REGLES	PROCEDURE DE REGLAGE
	BRANCHEMENT	FREQUENCE				
	REGLAGE DE RF-MW					
1	Brancher le AM-SG à la borne de l'antenne AM par un condensateur de 200pF. Commun au châssis. (Entrée faible)	612kHz (modulé à 30% par 400Hz)	612kHz	Brancher le voltmètre à courant alternatif et l'oscilloscope aux borne de sortie (OUT-PUT) de l'appareil.	L202 (Bobine Ant.)	1. Régler au maximum de signal de sortie. 2. Régler le noyau ferrite de L202 à l'aide d'un tournevis.
2		1503kHz (modulé à 30% par 400Hz)	1503kHz		CT201 (Trimmer Ant.)	1. Régler au maximum de signal de sortie. 2. Refaire les étapes (1) et (2) jusqu'à ce que le fréquence s'aligne correctement avec l'affichage du cadran.

	AM GENERATEUR		FREQUENCE D'AFFICHAGE PAR PREREGLAGE	PREPARATIONS	ELEMENTS REGLES	PROCEDURE DE REGLAGE
	BRANCHEMENT	FREQUENZ				
	REGLAGE DE RF-LW					
3	Brancher le AM-SG à la borne de l'antenne AM par un condensateur de 200pF. Commun au châssis. (Eintrée faible)	155 kHz (modulé à 30% par 400 Hz)	155 kHz	Brancher le voltmètre à courant alternatif et l'oscilloscope aux borne de sortie (OUTPUT) de l'appareil.	L253 (Bobine Osc.)	1. Régler au maximum de signal de sortie. 2. Régler le noyau ferrite de L253 à l'aide d'un tournevis.
4		353 kHz (modulé à 30% par 400 Hz)	353 kHz		CT251 (Trimmer Ant.)	1. Régler au maximum de signal de sortie. 2. Refaire les étapes (3) et (4) jusqu'à ce que le fréquence s'aligne correctement avec l'affichage du cadran.

REGLAGE DE FM

• Réglage et équipement untilisé

1. Générateur du signal FM (FM-SG)
2. Commande de réglage stéréophonique (ou vu-mètre de séparation).
3. Jauge de distorsion.
4. Voltmètres électronique de courant alternatif et de courant continu (VTVM).
5. Compteur de fréquence (19kHz et 108MHz mesurable).
6. Antenne fictive FM, 300 ohms(Fig. 10)
7. Sélecteur de gamme . . . . . FM
8. Placer le sélecteur de mode FM sur la position "mono".
9. Les autres réglages sont les mêmes que pour la mise au point de l'amplitude modulée (AM).

• Préparation du générateur de signal FM (FM-SG)

1. Alimenter la sortie SG à la borne de l'antenne de l'appareil, par l'antenne fictive FM 300 ohms.
2. L'entrée standard de l'appareil est de 60dB (1mV), 400Hz, 100% de modulation (à cause de l'utilisation de l'antenne fictive, la sortie SG doit être de plus 12dB (IHF). Ce qui signifie que guand l'entrée est de 60dB, la sortie SG doit être de 72dB).

	FM GENERATEUR		FREQUENCE D'AFFICHAGE PAR PREREGLAGE	PREPARATIONS	ELEMENTS REGLES	PROCEDURE DE REGLAGE
	BRANCHEMENT	FREQUENCE				
	REGLAGE DE LA DISTORSION FM EN MONO					
5	Branchez sur la prise d'antenne FM à travers une antenne fictive FM. (Niveau de sortie du générateur 60dB).	Sans signal	100.1 MHz	Brancher le voltmètre électronique a c.c. aux bornes TP101 et TP102 (Voir la Fig. 11)	T101 (Transfor FI discri.)	1. Régler le noyau T101 de telle sorte que le voltage mesuré dans le mode sans signal, soti de 0mV dans la gamme des.
6		100.1 MHz (modulé à 100% par 400 Hz)	100.1 MHz	Branchez un distor-tion métre sur les bornes de haut-parleur de appareil.	T102 (Transfor FI discri.)	1. Régler le noyou T102 de telle sorte que la distor-tion des canaux droit et gauche soit la plus faible.
	REGLAGE (VCO) PILOTE MULTIPLEX FM					
7	Branchez sur la prise d'antenne FM à travers une antenne fictive FM. (Signal monoscous-tique.)	100.1MHz (Non modulé)	100.1MHz	Brancher le compteur de fréquences à la borne TP301 par l'intermédiaire d'une résistance de 100kΩ.	VR301 (VCO)	1. Commutateur de mode . . . . . auto 2. Régler VR301 sur 19 kHz ± 30 Hz.
	FREQUENCEMETRE ANALOGIQUE FM					
8	———	Pas de signal	108.0 MHz	———	VR 901 (Fréquencemétre)	1. Ajuster VR901 de telle sorte que le fréquence mètre indiqué 108.0 MHz (Se référer à la Fig. 12) 2. Ensuite, manipuler le bouton de synthonisation de façon à ce que 88.1 MHz et 100.1 MHz soient indiqués sur l'affichage de fréquence numérique. Puis, s'assurer que l'indicateur est en contact avec chaque lettre. 3. Si la condition nécessaire à l'étape 2 n'est pas satisfaite, revenir à l'étape 1 et ajuster l'indicateur en deçà de la ligne pointillée de la Fig. 12.

Printed in Japan
82063400(H) YK